

✓ A VISUAL ASSESSMENT OF REHABILITATED SURFACE
COAL MINES IN THE WESTERN UNITED STATES/

by

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B.S. Business Administration,
University of Colorado, 1985

A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF LANDSCAPE ARCHITECTURE

Department of Landscape Architecture

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1989

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	iii
LIST OF FIGURES	iv
LIST OF TABLES	v
CHAPTER I - INTRODUCTION	1
Background	2
Research Scope and Objectives	4
Research Format	6
CHAPTER II - BACKGROUND	7
Legislation	8
Surface Mining Control and Reclamation Act	11
Visual Resource Management	12
Expert/Professional Landscape Assessment	
Models	14
Behavioral and Humanistic Landscape	
Assessment Approaches	15
Surface Mining in the Western United States	16
Mining Operations	17
Mined-Land Reclamation	22
Rehabilitation in the Western United	
States	25
Administration	27
Evaluating Reclamation Success	30
CHAPTER III - METHODOLOGY AND PROCEDURE	33
Research Intent	33
Operational Definitions	34
Methodology	34
BLM Visual Resource Methodology	35
Applicability of BLM Visual Resource	
Methodology	36
Visual Resource Inventory Process	37
Site Selection	42
Procedure	46
Data collection and sampling	47
Adaptation of BLM scenic quality	
inventory process to study	
conditions	48
Limitations of the Study	51

Study Sites	53
Study Site One	53
Landform	55
Vegetation	57
Rehabilitated landscape	57
Study Site Two	60
Vegetation	61
Rehabilitated land	62
Study Site Three	63
Undisturbed landscape	64
Rehabilitated landscape	66
Study Site Four	69
Undisturbed land	70
Rehabilitated land	72
Study Site Five	77
Vegetation types	78
Landscape diversity	79
Rehabilitated landscape	80
Revegetation	83
Study Site Six	84
Landform and vegetation	85
Rehabilitated lands	87
Revegetation	89
CHAPTER IV - RESULTS	91
Statistical Evaluation of Data	92
Findings	93
Analysis	94
Comparison of Landscape Factors	94
Color and Interaction Effects	96
Supplementary References	97
Pre-existing Visual Quality References	101
CHAPTER V - CONCLUSIONS AND RECOMMENDATIONS	105
The Application BLM Visual Resource Management	
Methodology to Disturbed Landscapes	106
Public Interest Issues	110
The Surface Mining Control and Reclamation Act	112
Technological Aspects	115
Final Observations	117
LITERATURE CITED	120
APPENDIX A - References	A-1
APPENDIX B - Scenic Inventory Evaluations	A-4
APPENDIX C - Statistical Analysis	A-40

ACKNOWLEDGEMENTS

This study could not have been completed without support and guidance from personnel employed by the following agencies and corporations:

USDI Bureau of Land Management, Farmington Resource Area, New Mexico.

USDI Bureau of Land Management, Medicine Bow-Divide Resource Area, Wyoming.

USDI Bureau of Land Management, Buffalo Resource Area, Wyoming.

USDI Bureau of Land Management, Powder River Resource Area, Montana.

USDI Bureau of Land Management, Little Snake Resource Area, Colorado.

USDI Bureau of Land Management, Wyoming State Office, Cheyenne, Wyoming.

USDI Office of Surface Mining Reclamation and Enforcement, Denver, Colorado.

Utah International Inc., New Mexico.

Arch Mineral Corporation, Wyoming.

Amax Coal Company, Wyoming.

Western Energy Company, Montana.

Peabody Coal Company, Colorado.

The College of Natural Resources and Department of Landscape Architecture, Utah State University, Logan, Utah.

Special gratitude is extended to faculty, friends and family who have encouraged me in this endeavor.

LIST OF FIGURES

FIGURE 1.01:	Federal Coal Producing Regions	5
FIGURE 2.01:	Generalized Coal Provinces of the United States	18
FIGURE 2.02:	Area Strip Method of Mining	21
FIGURE 3.01:	BLM Visual Resource Inventory Rating Criteria	38
FIGURE 3.02:	BLM Scenic Quality Inventory and Evaluation Chart	39
FIGURE 3.03:	BLM Scenic Quality Field Inventory Form	40
FIGURE 3.04:	BLM Scenic Quality Rating Summary . . .	41
FIGURE 3.05:	Physiographic Provinces of the United States	43
FIGURE 3.06:	Physiographic Map of the Western United States	54
FIGURE 3.07:	Study Site One, Rehabilitated and Undisturbed Land	56
FIGURE 3.08:	Study Site Three, Highwall Remnant . .	68
FIGURE 3.09:	Study Site Four, Upland Sage/Aspen Ecotype	73
FIGURE 3.10:	Study Site Four, Pre-SMCRA Rehabili- tation and Pond	75
FIGURE 3.11:	Study Site Five Ephemeral/Intermittent Creek	81
FIGURE 3.12:	Study Site Five, Reconstructed Drainageway	82
FIGURE 3.13:	Study Site Six, Ponderosa Seedlings . .	88
FIGURE 4.01:	Visual Quality Rating Graph	95

LIST OF TABLES

TABLE 2.01:	Production from Western Coal Mines . . .	19
TABLE 2.02:	Estimated Coal Reserves Over One Billion Tons	28
TABLE 4.01:	State and Federal Reclamation Standards and Industry Objectives	100
TABLE 4.02:	Visual Resource Quality Comparisons . .	103

CHAPTER I

INTRODUCTION

The United States has long been regarded as a nation blessed with abundant and, until recently, seemingly, unlimited natural resources. Continued use of these resources is fundamental to economic growth and development. Landscape Architects, land and resource managers, industrialists, environmental planners, legislators, and educators must insure that resource supplies will meet future needs in spite of today's escalating demands. The scenic resource is among the natural resource systems impacted by mining operations. The scenic resource encompasses the entire aesthetic character of a landscape, rather than a view or series of views. And, like other resources, a scenic resource can be used. Such use may degrade, exploit, preserve or enhance the scenic resource (Gussow, 1979).

Background

In the past 20 years there has been increased government regulation mandating the consideration of aesthetics in land use and land management decision making. The National Environmental Policy Act of 1969 (NEPA) identifies aesthetics as a component of environmental quality. One of the goals specified is to "assure for all Americans, healthful, productive, and esthetically and culturally pleasing surroundings" (Section 101(b)). The Federal Land Policy and Management Act of 1976 (FLPMA) further stipulates that federal land management policy will include provisions to protect the quality of scenic values (Section 102(8)). The following legislative acts acknowledge the importance of scenic resources in land-use planning and land management strategy:

The National Trails Act, 1968

The National Wild and Scenic Rivers Act, 1968

The Coastal Zone Management Act, 1972

The Endangered Species Act, 1972

The National Forest Management Act, 1976

The Clean Air Act amendments, 1977

The Public Rangeland Improvement Act, 1978

In 1977 The Surface Mining Reclamation and Control Act (SMRCA) was enacted in response to increasing public concern over the environmental, social, visual, and economic impacts of surface coal mining. SMRCA makes minimizing adverse affects to visual resources a requirement for all surface mining activities (Ross, 1979). The performance standards established in Section 515 represent the strongest effort to protect the aesthetic integrity of rehabilitated mined-lands.

While current legislation expresses the intent and directive to protect the visual resource, it fails to establish specific criteria that can be used to achieve this goal (Seddon, 1983). The regulating agencies that evaluate and administer the rehabilitation process, therefore, do not consider the aesthetic dimension in defining rehabilitative success. Research has concentrated on scenic/visual resource analysis generally and made less progress toward the development of scenic evaluation methods with specific applicability to mined-lands (Law, 1984). Consequently, reclamation practices, in general, lack focus in the area of aesthetic consideration.

Research Scope and Objectives

The purpose of this research is to assess the visual quality of rehabilitated surface coal mines in the western United States. Visual quality at six surface coal mines in four western states (Figure 1.01) is evaluated using visual resource management methodology developed by the United States Bureau of Land Management (BLM, 1986). This research suggests topics for consideration by landscape architects, reclamation specialists, land-use managers, and regulatory authorities which relate to improved visual quality. The major issues addressed include:

- 1) The effects of administrative and regulatory policy on reclamation practices.
- 2) The role of technology and innovation in the reconstruction of mined-lands.
- 3) The applicability of traditional scenic/visual resource analysis models to rehabilitated landscapes.

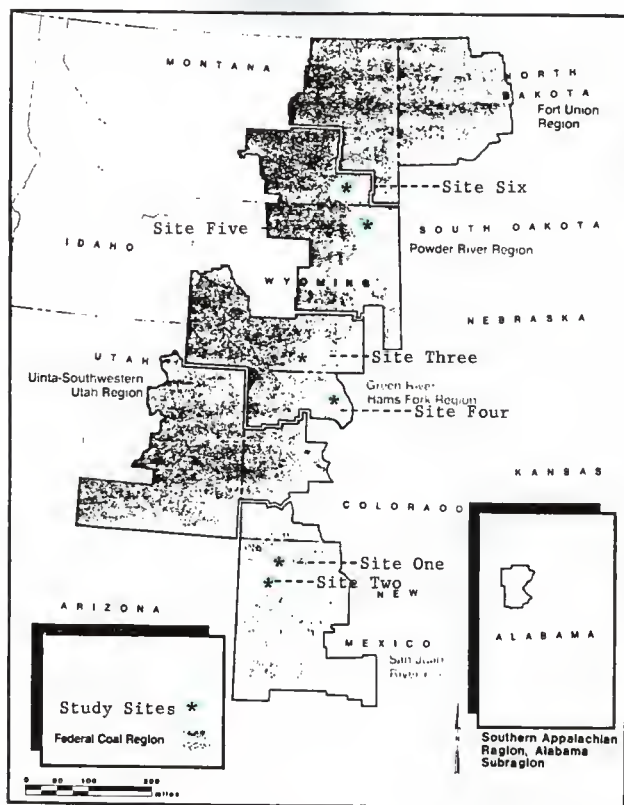


FIGURE 1.01: Federal Coal Producing Regions (Source: Office of Technology Assessment, 1986).

Research Format

Following this introduction, background material is presented. Chapter II includes an explanation of the legal and administrative aspects of mined-land reclamation and visual resource management. Visual resource analysis and mining and reclamation procedure are also discussed. Chapter III describes the research methodology and procedure. It begins with a statement of basic assumptions and research intent. Information pertaining to the Bureau of Land Management Visual Resource Management methodology is then presented. An explanation of study site selection and a detailed account of on-site sampling procedure follows. Limitations of the study are then described. A brief profile of each of the six study sites concludes Chapter III. Chapter IV contains a summary and analysis of the data collected. Based on this analysis, significant findings are reported. Conclusions are presented in Chapter V. Observations and recommendations are offered as well. Topics addressed include the administrative, social, and technological aspects of mined-land reclamation and their impact on the visual resource.

CHAPTER II

BACKGROUND

Very little research has focused on the aesthetic character of rehabilitated mined-lands. The legal framework that mandates consideration of scenic values in land-use planning and decision making, however, is well established. The literature on visual/scenic analysis and viewer perceptions is extensive as well. Still, much debate centers around whether or not aesthetic values can or should be legislated (Smardon, 1978), and how aesthetic values can most accurately be quantified (Bechtel, 1987). Many aspects of reclamation and mining operations have also been meticulously investigated. Environmental processes that most directly affect public health and safety are well documented. Assessment of impacts to cultural and social resources (including the scenic resource) are less common -- even though these concerns provided much of the original impetus for current coal mining regulation. Surface coal mining legislation does not explicitly address aesthetic values; instead environmental standards that mitigate effects on scenic quality are imposed.

The background material provided in this chapter will first familiarize the reader with the laws that govern the rehabilitation process. Those that regulate scenic resource use, and mining and reclamation operations are included. Because rehabilitation success is inextricably tied to mining and reclamation operations, a brief summary of these processes is also included. In addition, a basic understanding of visual resource analysis and inventory methods is necessary. Chapter II also includes a review of scenic/visual resource evaluation methods and describes how they are adapted and implemented by land management agencies. Finally, since coal mining and reclamation, and management of visual resources are within the purview of federal government agencies (in this case the BLM), administrative authority and responsibilities are also outlined.

Legislation

Coal mining operations in the United States are regulated by federal, state, and local laws. Included among these are the Surface Mining Control and Reclamation Act and the environmental legislation passed during the 1960's and 1970's. These laws were enacted in response to

demands for the protection of environmental values and public well-being.

Of these, the National Environmental Policy Act of 1969 (NEPA) is the most comprehensive. NEPA sets forth the resource management policy and goals for our nation. Throughout NEPA the mandate to manage and protect scenic values is explicit. The most substantive directive is to: "Assure for all Americans ... esthetically and culturally pleasing surroundings." (Section 101(6)). To insure that this goal is accomplished agencies of the federal government are directed to:

"... identify methods and procedures, consultation with the Council on Environmental Quality established by Title II of this Act, which will insure that presently enquantified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations." (Section 102(2)(B))

Furthermore, NEPA requires that a multidisciplinary approach to land management be used. Section 102(2)(A) directs agencies to:

"... utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on man's environment."

These provisions apply to all federal agencies, to all their activities, and to all environmental values--including scenic values.

Over 60% of the known coal reserves in the western United States lie within the federal estate. The U.S. Bureau of Land Management (in some cases the United States Forest Service) has been entrusted with the responsibility to manage and protect public lands. The Federal Land Policy and Management Act of 1976 (FLPMA) defines the role of managing agencies and directs administrative policy. FLPMA requires federal agencies to protect and manage environmental resources, including scenic values, for public use and enjoyment. The strongest directive requires that:

"The public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource and archeological values; ..." (Section 102(8)).

Surface coal mining and reclamation has been regulated in some states since the late 1930's. Efforts to curb adverse environmental impacts, however, were not always successful. With the adoption of the Surface Mining Control and Reclamation Act (SMCRA) in 1977, uniform national standards for mining operations and reclamation were set forth.

Surface Mining Control and Reclamation Act

SMCRA established minimum performance standards to insure that environmental, economic, and social impacts are minimized (Section 515). Significant among these is the requirement to restore disturbed lands to "higher or better use" (Section 515(b)(2)), as well as, "approximate original contour" (Section 515(b)(3)). SMCRA further requires the minimization of disturbance to existing resource systems (Section 102(a)(d)).

In recognition of diverse topographical, climatological, geological, hydrological and biological regimes, primary responsibility for regulating surface mining is given to the states. The act permits state and local governments to enforce environmental controls and regulations that meet or exceed federal standards.

Under SMCRA, mining companies are required to submit detailed and comprehensive mining and reclamation plans. The mining and reclamation plans must meet or exceed established performance standards. Based on the mining and reclamation plan a mining permit is granted by state authorities. Performance standards are enforced by state authorities through regular on-site inspection, renewal of the mining permit, and the requirement for performance bonds. The federal Office of Surface Mining and

Reclamation (OSMRE) oversees the permit program and provides technical assistance when needed.

The integrity of the visual resource is addressed implicitly through general legislative intent and the performance standards. The standards that relate to the re-establishment of pre-mining contour (Section 515(b)(3)), proper spoils handling (Section 515(b)(22)(G)), and prompt revegetation (Section 515(b)(19)(20)) directly affect visual quality. Rather than addressing aesthetic quality specifically, SMCRA establishes environmental criteria that indirectly minimize adverse scenic impacts.

Visual Resource Management

Many different terms are used to describe visual resource management methods: scenic resource analysis, scenic quality assessment, visual resource evaluation, landscape preference assessment, visual impact analysis/mitigation, scenic beauty estimation, visual management systems, and landscape management, analysis, assessment, etc. However stated, visual resource management typically includes an inventory of landscape attributes and/or viewer perceptions, analysis and

classification of the landscape, and development of appropriate management strategy. Although landscape architects, resource managers and theorists have labelled and refined this process, landscape assessment is, in essence, a very old phenomena.

Since humans were first aware of the environment around them, they have left evidence of their awareness. Observation and assessments of the landscape have been recorded throughout history -- from the cave paintings at Lascaux (15,000-10,000 B.C.) continuing through today. Art works, however, are generally a personal and intuitive response to the landscape which reflects individual and cultural experiences and values. Procedures for standardizing and comparing personal evaluations of the landscape have only recently been developed.

The first formal scenic assessment measures were developed in response to the mandates created by environmental legislation enacted during the 1960's and 1970's. Faced with implementing the new scenic protection policies, federal government agencies (most notably the U.S. Forest Service and the Bureau of Land Management) sought to develop standardized visual assessment measures. The methods they developed are called expert or professional landscape assessment models (Zube, 1984).

Expert/Professional Landscape Assessment Models

Expert landscape assessment models rely on professional judgment of landscape values. Expert models integrate environmental and ecological theories, and basic design principals. Visual resource management strategy usually begins with an inventory and classification of the landscape. The inventory is based on viewer preference ratings, or on qualitative or quantitative measures (descriptions) of physical features within the landscape. Nearly all expert/professional approaches incorporate inventory methods that describe landscape features. Typically, physical features within the landscape are assigned numerical values based on accepted design criteria. These numerical representations, then, are used for comparative evaluation (Litton, 1979).

Most federal agencies use expert approaches to manage visual resources. Expert models have high practical utility, partially because they measure landscape properties that can be changed or manipulated. Research suggests that landscape ratings derived from these models are generally good predictors of landscape preference. The cause of landscape preference, however, cannot be clearly demonstrated using expert models (Zube, 1982; Miller, 1984). In general, the expert approach is

subjective and not amenable to tests of reliability or validity in the usual sense (Bechtel, 1987). (Further discussion of the expert visual assessment approach is provided in Chapter III - Methodology subsection.)

Behavioral and Humanistic Landscape Assessment Approaches

Visual quality is a function of viewer perception as well as the physical character of the landscape. Behavioral and humanistic visual assessment models emphasize the role of the observer in scenic quality assessment. Behavioral models evolved from the tradition of experimental psychology. The focus of this approach is on the role human survival, adaptation, and evolution play in landscape preference/perception. (The reader is referred to works by Appleton, 1975, and Tuan, 1974, for further discussion of behavioral assessment theories.) Lastly, the humanistic approach focuses on the role of the observer as participant in the landscape. Human qualities such as culture, knowledge, experience, needs, and intentions are identified as the determinants of perceived visual quality. (See the works of Rachel and Stephen Kaplan, 1972-1979, and Gibson, 1977, for further

discussion of humanistic approaches.)

These landscape assessment approaches have been summarized to give the reader a frame of reference for this study. The methodology used to conduct this research is an adaptation of the expert approach using descriptive inventory measures. Chapter III - Methodology and Procedure describes this process in detail.

Surface Mining in the Western United States

Surface mining is the oldest and most economical method of mining coal. Six out of every 10 tons of coal mined in the United States are produced from surface mines (National Coal Association, 1988). Today's largest mining operations cover thousands of acres and yield as much as 22 million tons of coal per year. Because of projected increases in energy demands, and improvements in mining technology, coal mining production rates are expected to increase in years ahead.

In the western United States surface coal mining is relatively new. Most mines have been developed since the 1970's, yet surface mining accounts for nearly 80 percent of the regional production. Over half the demonstrated U.S. coal reserves are located in the Northern Great

Plains and Rocky Mountain Mining Provinces of the western United States (Figure 2.01). The major coal producing states within the region are New Mexico, Colorado, Wyoming, Montana, North Dakota, and Utah. With the exception of mines in Utah and portions of Colorado, most western coal is produced by surface mining methods. This study focuses on mining operations in New Mexico, Colorado, Wyoming, and Montana. In 1985 these states produced 229,398,000 tons of coal, approximately 92 percent of western coal production (Table 2.01, Keystone Coal Industry Manual, 1987).

Mining Operations

Surface mining consists of four phases: 1) exploration; 2) development; 3) production; and 4) reclamation (Leopold, Rowland, Stadler, 1979). The exploration phase involves locating, sampling, and mapping the coal deposit. Development includes the construction of mine support facilities, and preparation of mining and reclamation plans. The focus of this section is on the production phase. Production encompasses four major activities: 1) site preparation (removal of topsoil and

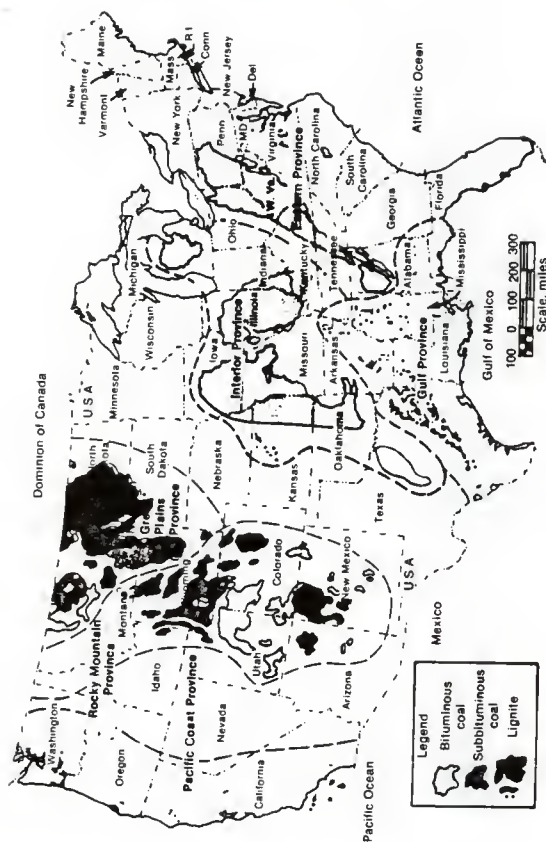


FIGURE 2.01: Generalized Coal Provinces of the United States (Adapted from Office of Technology Assessment, 1986).

1985 Production From Western Coal Mines (thousands of tons)

State	Surface Production	Percent of Total	Underground Production	Percent of Total	Total Production
Arizona	9,625	100%	0	0%	9,625
Colorado	10,742	62	6,562	38	17,304
Montana	33,141	100	0	0	33,141
New Mexico	20,909	100	0	0	20,909
North Dakota	26,136	100	0	0	26,136
Utah	0	0	13,141	100	13,141
Wyoming	138,470	99	1,954	1	140,424
Total	239,023	92	21,657	8	260,680

TABLE 2.01: 1985 Production from Western Coal Mines
(Source: Keystone Coal Industry Manual, 1987).

vegetation); 2) blasting and removal of overburden (material overlying the coal deposit); 3) excavation; and 4) transportation.

In the coal bearing regions of the West the terrain is flat or gently rolling and extensive coal deposits (as much as 150 feet thick) lie relatively close to the earth's surface (usually within 150 feet). The most commonly used method to extract coal is the area strip mining method (Figure 2.02). To extract the coal a rectangular trench (boxcut) is made through the overburden to expose the layer of coal (seam). A huge dragline or shovel (some with bucket capacities of 220 cubic yards) makes successive parallel cuts and piles (spoils) the overburden in the previously cut trench. Haul trucks with capacities up to 175 cubic yards transport the coal for processing, storage, or transportation. When the mining process is complete, a succession of furrows and an open trench with exposed high wall remain (Law, 1984; Leopold, Rowland, Stadler, 1979).

Surface mining operations dramatically change the visual character of the environment. The visual impacts of surface mining result from development and production activities and the associated environmental impacts--both on and off-site. During mining operations millions of tons of earth are removed and relocated. Existing

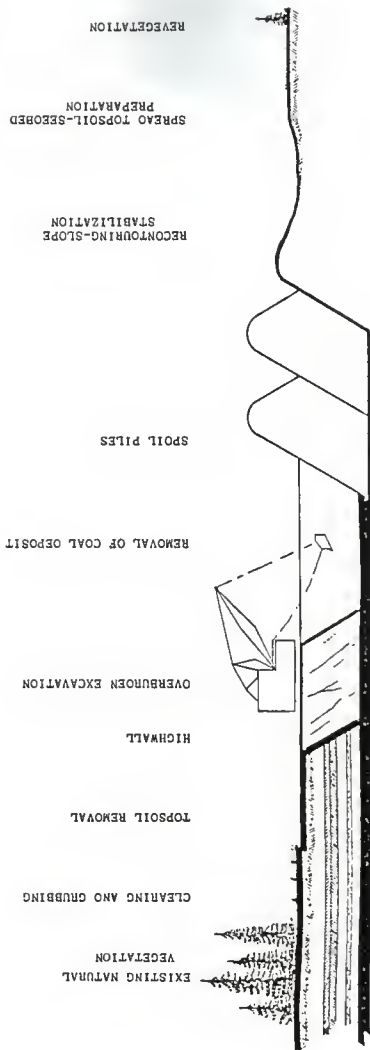


FIGURE 2.02: Area Strip Method of Mining (Source: Mined-Land Rehabilitation, Law, 1984).

vegetation and natural drainage patterns are severely disturbed or destroyed. Changes in natural landform, color, and texture that create contrast between the mine and the surrounding landscape constitute major visual impacts (Simpson, 1979). Visual impacts are also a function of time. The amount of time necessary for a disturbed area to regenerate to an acceptable level of visual quality depends on many factors. In the West this process may take hundreds of years or more (USDI BLM, 1983).

Mined-Land Reclamation

In the western United States millions of acres of land have been disturbed by surface mining. In the 11 years since SMCRA was enacted approximately 3 million acres have been reclaimed (USDI, 1983). Current rates of disturbance are expected to increase in the future.

The term reclamation implies that the site is habitable by organisms that were originally present or by others that are similar to the original inhabitants. Rehabilitation, on the other hand, denotes a process that returns the land to a form and level of productivity that conforms with a prior land use plan, including a stable

ecological state that does not contribute substantially to environmental deterioration and that is consistent with surrounding aesthetic values (National Academy of Science, 1974, as cited in Law, 1984). SMCRA requires that surface coal mining and reclamation as a minimum shall:

"... restore the land affected to a condition capable of supporting the uses which it was capable of supporting prior to any mining, or higher or better uses of which there is a likelihood, so long as such uses do not present ... hazard to public health or safety ... and is not inconsistent with applicable land use policies and plans, ..." (SMCRA, Section 515(b)(2)).

The Surface Mining Control and Reclamation Act specifically addresses environmental issues related to surface and ground water hydrology, soils, and overburden, revegetation, and wildlife. While it is convenient to look at reclamation in terms of the various resource systems, it is important to remember that reclamation involves the reconstruction of subsurface and surface components of the ecosystem, and all aspects of the ecosystem are interrelated.

Slope stabilization and revegetation are the most important reclamation tasks (Law, 1984). These two factors directly control erosion and sedimentation which are among the most critical environmental impacts associated with surface mining. Federal and state laws

require reconstruction of "approximate original contour of the land with all the high walls, spoil piles and depressions eliminated" (SMCRA, Section 515(b)(3)). The Environmental Protection Performance Standards established in SMCRA further requires operators to "stabilize and protect all surface areas ... to effectively control erosion and attendant air and water pollution" (SMCRA, Section 515(b)(4)). The final landscape configuration must be compatible with natural drainage patterns and the surrounding environment (SMCRA, Section 515(b)(22)(G)). The law also requires that revegetation "establish on the regraded areas, and all other lands affected, a permanent vegetative cover ... equal in extent of cover to the natural vegetation of the area ..." (SMCRA, Section 515(b)(19)). Non-native plant species may be used if use is consistent with the post-mining land-use objectives.

Reclamation operations ideally occur parallel to the excavation, as the coal is being extracted (contemporaneous reclamation). Overburden is removed from above the coal seam and placed directly in the area of the previous cut, where it is then backfilled and graded (primary or rough grading) to post-mining contour. Simultaneously, topsoil is stripped from areas ahead of the excavation and placed directly on the newly contoured overburden. After final grading (secondary or finished

grading) the area is prepared for seeding and planting.

This is the sequence of reclamation in the most simplistic sense. In reality, the reclamation process is very complex. For example, overburden frequently accumulates in piles (spoils) and topsoil is often stockpiled until an area is ready to be reclaimed. A myriad of conditions and factors affect this process-- scheduling, overburden/coal ratio (stripping ratio), pit location and configuration, availability of men and equipment, market demands, and weather and season among them.

Rehabilitation in the Western United States

The areas represented in this study are diverse in terms of soils, hydrology, and vegetation; yet they present reclamation specialists with similar and significant challenges. The landform and climate of the West vary considerably, from the dry desert regions of northern New Mexico to the foothills of the Colorado Rockies, to the rolling plains of northeastern Wyoming. Precipitation is generally low in the West, varying from as little as six inches per year in the high deserts of New Mexico to an average of 16 to 24 inches per year in

Colorado and Montana. Soils are generally shallow and usually lacking in organic matter, resulting in reduced capacity to absorb and hold moisture. Rainfall frequently occurs in short but intense bursts, often causing severe erosion. Droughts are common. At higher elevations most precipitation occurs during the winter months in the form of snowfall. In most areas temperatures and evaporation rates are such that the most critical limitation to rehabilitation success is the lack of available moisture.

The environmental quality of rehabilitated land must meet or exceed state and federal performance standards in spite of diverse and sometimes harsh environmental conditions. Some of the reclamation strategies developed to meet this requirement are: direct-haul of topsoil, overburden as a topsoil substitute, two-lift soil handling, various seedbed preparation methods, special surface water restoration techniques, replacement of aquifers, irrigation, dragline reclamation, habitat replacement and enhancement, specialized seed mixtures, revegetation of woody plants, and grazing. Discussion of some of these techniques, as they apply to the enhancement of visual quality, will be provided in Chapter III under the Study Sites subsection and in Chapter V under the Technology subsection.

Administration

In the West the federal government owns and administers a large proportion of the land overlying coal deposits, as well as a majority of subsurface deposits (Table 2.02, National Coal Association, 1987). The pattern of land ownership in the West often resembles a "checkerboard" of private and public lands -- making administration particularly complex. Approximately 70 percent of the surface mines in the western United States incorporate federal coal. In some cases the federal government owns the coal resources but not the surface rights (split estate lands). In either case, coal development rights must be leased from the federal government.

Late in 1982 the United States Secretary of the Interior assigned primary responsibility for administration of coal leasing and production on federal lands to the Bureau of Land Management. The BLM administers approximately 63 million acres of subsurface mineral rights -- approximately 50 percent of total western coal reserves.

Estimated Coal Reserves Over One Billion Tons

(Billion Short Tons)

Holder	Est. Reserves
U.S. Government	156.4*
Burlington Northern	14.6
Consolidation Coal Co.	10.3
Rocky Mountain Energy Co.	10.0
Exxon Coal and Minerals Co.	8.5
Peabody Holding Co. Inc.	8.4
Phillips Coal Co.	8.0
El Paso Natural Gas	5.2
North American Coal Corp.	4.0
Amax Coal Co.	3.1
Island Creek Corp.	3.0
Amber Coal Co.	3.0
Mobil Corp.	2.9
Shell Mining Co.	2.7
USX	2.3
Sun Co.	2.2
Kaiser Coal Corp.	2.1
Pittsburg & Midway Coal Mining Co.	1.9
Bethlehem Steel Corp.	1.8
Kerr-McGee Coal Corp.	1.7
NERCO Inc.	1.7
Tenneco	1.7
Texasco Inc.	1.7
Pittston Co.	1.7
Diamond Shamrock	1.5
Norfolk Southern Corp.	1.4
Drummond Co. Inc.	1.4
American Electric Power	1.3
Cypress Minerals Corp.	1.3
United Coal Cos.	1.3
Utah International Inc.	1.3
Donan	1.2
Texas Utilities	1.2
ARCO Coal Co.	1.1
Kenerco Corp.	1.1
Houston Natural Gas Corp.	1.1
United Energy Corp.	1.1
Westmoreland Coal Co.	1.1
Hillman Coal & Coke Co.	1.0
Zeigler Coal Co.	1.0
Western Energy Corp.	1.0
Northern Ill. Gas Co.	1.0
Northern Coal Co.	1.0
The Coastal Coal Group	1.0

*NCA estimate includes federal land, both leased and not-leased, in states west of the Mississippi River only, which constitutes the majority of federal coal holdings. Based on federal ownership of 60 percent of total western reserves.

TABLE 2.02: Estimated Coal Reserves Over One Billion Tons (Source: National Coal Association, 1987).

The administration of surface coal mining begins with leasing and/or permitting and ends with final reclamation bond release. Many federal and state agencies are involved in the administration process. Prior to leasing coal mining rights the BLM develops a comprehensive land-use/resource management plan (RMP) based on an environmental inventory. The plan includes an environmental impact statement (EIS). Scenic values are considered in the EIS. Lease stipulations, proposed in the EIS, can be attached to the lease to protect environmentally sensitive areas. The planning process also includes the designation of lands unsuitable for mining. In accordance with established criteria (43 CFR 3461.1), highly scenic areas (identified in the resource inventory) are designated unsuitable for mining. The resource management plan is a multidisciplinary effort, obligated to protect environmental resources, including the scenic resource (FLPMA, 1976).

Federal law requires that lands be managed for "multiple use and sustained yield" (43 CFR 251). In conjunction with overall resource planning and land management, the BLM is required to manage visual resources. Planning and decision making policy includes provisions to minimize the visual impact of land-use practices. To accomplish this, the BLM has developed a

system to evaluate and manage visual resources. The visual resource management system is applied to inventory scenic resources and make land-use classifications. The methodology used to assess visual quality in this study is based on part on the BLM Visual Resource Management (VRM) system (USDI BLM, 1986). The adaptation and application of the BLM system for this study is described in the following chapter (Methodology).

Although the BLM is the primary managing agency, permitting and reclamation are primarily the responsibility of the Office of Surface Mining Reclamation and Enforcement (OSMRE) and state authorities. Once approved, the application and plans serve as the administrative means to insure implementation of performance standards established by SMCRA. The plans include detailed environmental analysis and identify post mining land-use. The plans also establish standards for determining reclamation success.

Evaluating Reclamation Success

The performance standards established by SMCRA outline basic reclamation requirements (see Mined Land Reclamation subsection this chapter). Beyond this, most

states (all of those included in this study) have reclamation requirements that refine and augment those established by SMCRA (see Table 4.01). SMCRA defines reclamation as "those actions taken to restore mined land as required by this chapter to a postmining land use approved by the regulatory authority" (30 CFR 701.5). Once the mining and reclamation plan is approved by state and federal authorities, and the mining permit is issued, reclamation success is, theoretically, based on the environmental postmining land use.

Under the provisions of SMCRA (Section 509(a)) mine operators must post a reclamation performance bond in an amount sufficient to pay reclamation costs should the operator fail to meet his obligations. In the western United States regulatory authorities commonly set bonds as high as \$10,000 per acre. The reclamation bond for large mining operations may total millions of dollars. The bond money is released in phases that correspond to the operator's reclamation costs. Consequently reclamation success, in practice, is defined in terms of bond release criteria. The bond release phases outlined in SMCRA are as follows: Phase I - includes backfilling, grading, and drainage control (some states include topsoil replacement); Phase II - includes revegetation and sedimentation control; and Phase III - completion of all

mining and reclamation activities as specified in the permit (in the West this phase includes a mandatory 10 year liability period - SMCRA Section 519(C)(1-3)). The process of establishing specific bond release criteria beyond Phase I and II (in some states beyond Phase I) is still being developed by state regulatory authorities. In the meantime, state and federal performance standards (discussed earlier in this chapter) form the basis for evaluating reclamation success (OTA, 1986).

While current administrative policy considers the visual resource in determining land use and resource management plans, it does not include provisions to monitor or evaluate visual quality after reclamation has been completed. In the following chapter (Methodology) the method and procedure used in this study to assess the visual quality of rehabilitated mined lands is described in detail.

CHAPTER III

METHODOLOGY AND PROCEDURE

Research Intent

The purpose of this study is to assess the visual quality of rehabilitated surface coal mines in the western United States. Research methodology and procedures described in this chapter address the following questions:

- 1) What is the visual quality of rehabilitated mined lands?
- 2) How do factors within the rehabilitated landscape influence visual quality?
- 3) Does the visual quality of the rehabilitated landscape differ from that of the surrounding environment?

The visual quality of rehabilitated mined land at six surface coal mines in the western United States is assessed (see Figure 1.01). At each of the six sites the visual quality of adjacent undisturbed land is evaluated

for comparison. The method used to measure visual quality is an adaptation of the Visual Resource Inventory process developed and used by the United States Bureau of Land Management (USDI BLM, 1986).

Operational Definitions

To assist the reader in understanding the methodology and procedures described in this chapter, several terms need clarification. In the context of this chapter these terms are defined as follows:

Rehabilitated Land - Lands that have been mined or otherwise disturbed by mining operations upon which primary reclamation activities, including slope stabilization and revegetation are complete, and current activities are limited to monitoring environmental quality and maintenance.

Adjacent Undisturbed Land - Lands adjacent to or nearby rehabilitated mined lands evaluated in this study upon which grazing frequently occurs and agricultural, recreational, and/or rural residential use sometimes occurs.

Methodology

The methodology described below is supported by extensive informal interviews. From the beginning, this

study has relied on the expertise and suggestions of professionals in the field of mined-land reclamation and related fields. Background, study site selection, methodology and procedure, analysis, observations, and conclusions all incorporate information collected through personal interviews. Individual references are included in Appendix A.

BLM Visual Resource Methodology

The Bureau of Land Management (BLM) uses a visual resource inventory process to assess scenic values. The BLM inventory process includes a scenic quality evaluation and also measures visibility and public sensitivity. BLM lands are assigned to one of four visual resource inventory classes based on these three factors. Four visual resource inventory classifications represent relative levels of scenic quality. Class IV inventory designation indicates low scenic quality; Class III--moderate scenic value. Class I and II designations represent the highest scenic values. The visual resource inventory class designations are considered in the area Resource Management Plan (see Chapter II, Administration subsection) and become the basis for visual resource

management classes. Management objectives which determine land and resource use are established for each visual resource management class.

Applicability of BLM Visual Resource Methodology

A modified form of the Bureau of Land Management Visual Resource Inventory process is used to measure visual quality in this study. Several factors make this method appropriate. First, with one exception the BLM has management and/or advisory responsibility for all the lands evaluated in this study (30 CFR 750.6, 25 CFR 216.7, Chapter I). The BLM owns the surface and/or subsurface mineral rights to four of the study sites; others included are on Indian tribal lands or privately owned. Therefore, reference can be made to the Visual Resource Inventory and/or Visual Resource Management class designations previously assigned to the areas where the study sites are located (see Chapter IV, Table 4.02). In addition, the BLM Visual Resource Management methodology was developed to meet land management needs in the western United States, where vast, open, and sparsely populated lands are primarily used for grazing. Other methods, such as those developed by the USDA Forest Service to manage

predominantly forested lands, or the Soil Conservation Service Policies which focuses on countryside or suburban landscapes, are less suited to this study. Likewise, methods that measure viewer perceptions are more valuable in visually sensitive areas, recreation areas, or areas more densely populated. And finally, because the BLM methodology has such widespread application in the West (see Chapter II, Administration subsection), new information about its effectiveness is also of value.

Visual Resource Inventory Process

The scenic quality evaluation is the first step in the BLM visual resource inventory process and is used (with some modification) to measure the visual quality of the sites evaluated in this study. During the visual resource inventory process scenic quality is determined using seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity and cultural modifications (Figures 3.01 and 3.02). For every area evaluated each of the key factors within the landscape is rated relative to similar features within the physiographic province (Figures 3.03 and 3.04). Geologists and geographers have subdivided the United

landform

Topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental, as the Grand Canyon, the Sawtooth Mountain Range in Idaho, the Wrangell Mountain Range in Alaska, or they may be exceedingly artistic and subtle as certain badlands, pinnacles, arches, and other extraordinary formations.

vegetation

Give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when they are known to be recurring or spectacular. Consider also smaller scale vegetational features which add striking and intriguing detail elements to the landscape (e.g., gnarled or windshorn trees, and Joshua trees).

water

The gradient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.

color

Consider the overall color(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) as they appear during seasons or periods of high use. Key factors to use when rating "color" are variety, contrast, and harmony.

adjacent scenery

Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance which adjacent scenery will influence scenery within the rating unit will normally range from 0-3 miles, depending upon the characteristics of the topography, the vegetative cover, and other such factors. This factor is generally applied to units which would normally rate very low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.

scarcity

This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.

cultural modifications

Cultural modifications in the landform/water, vegetation, and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion or complement or improve the scenic quality of a unit. Rate accordingly.

FIGURE 3.01: BLM Visual Resource Inventory Rating Criteria (Source: USDI BLM, 1986).

SCENIC QUALITY INVENTORY AND EVALUATION CHART			
key factors	rating criteria and score		
landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops; or severe surface variation or highly eroded formations including major badlands or dome system; or detail features dominant and exceptionally striking and intriguing such as glaciers. 5	Steep canyons, mesas, buttes, tinder cones, and drumlins; or interesting arational patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. 3	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. 1
vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. 5	Some variety of vegetation, but only one or two major types. 3	Little or no variety or contrast in vegetation. 1
water	Clear and clean appearing, still, or touching white water, any of which are a dominant factor in the landscape. 5	Flowing, or still, but not dominant in the landscape. 3	Absent, or present, but not noticeable. 0
color	Rich color combinations, variety of vivid colors; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. 5	Some intensity of variety in colors and contrast of the soil, rock, and vegetation, but not a dominant scenic element. 3	Subtle color variations, contrast, or interest; generally muted tones. 1
influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. 5	Adjacent scenery moderately enhances overall visual quality. 3	Adjacent scenery has little or no influence on overall visual quality. 0
scarcity	One of a kind, or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc. 5+	Distinctive, though somewhat similar to others within the region. 3	Interesting within its setting, but fairly common within the region. 1
cultural modifications	Modifications add favorably to visual variety while promoting visual harmony. 2	Modifications add little or no visual variety to the area, and introduce no discordant elements. 0	Modifications add variety but are very discordant and promote strong disharmony. -4

INSTRUCTIONS

Purpose: To rate the visual quality of the scenic resources on all BLM managed lands.

How to Identify Scenic Values: All Bureau lands have scenic values.

How to Determine Maximum Suitability: All BLM lands are rated for scenic values. Also rate adjacent or intermingling non-BLM lands within the planning unit.

When to Evaluate Scenic Quality: Rate for scenery under the most critical conditions (i.e., highest user period or season of use, daylight, proper atmospheric conditions, etc.).

How to Determine Rating Areas: Consider the following factors when delineating rating areas.

1. Line physiographic characteristics (i.e., land form, vegetation, etc.).
2. Similar visual patterns, textures, color, variety, etc.
3. Areas which have a similar impact from cultural modifications (i.e., roads, historical and other structures, mining operations, or other surface disturbances).

Explanation of Criteria: (See illustration 1)

NOTE: Values for each rating criteria are maximum and minimum scores only. It is also possible to assign scores within these ranges.

SCENIC QUALITY

A = 19 or more

B = 12-18

C = 11 or less

FIGURE 3.02: BLM Scenic Quality Inventory and Evaluation Chart (Source: USDI BLM, 1986).

Form 8400-1
(September 1983)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SCENIC QUALITY FIELD INVENTORY

Date Aug. 15, 1985

District MOAB

Resource Area Grand

Scenic quality rating unit

0.24

1. Evaluators (names)

Bob Tunstetter, Russ Grimes, Pete Jordan

2. LANDSCAPE CHARACTERISTICS

	a. LANDFORM/WATER	b. VEGETATION	c. STRUCTURE (form)
FORM	steep and side canyons with earth	simple forms created by	oval elongated and
	red walls leading into flat open	patterns in vegetation	linear
	yellow hills and meadows rise		
	horizontal & vertical in cliff form	irregular indistinct	rounded vertical
LINE	steep, jagged ridges, lines and		
	meandering river		
COLOR	orange and green dominant	dark green, mixed	light green & green
	deep blue in settling pond	bottom, green, blue	
		whites	
TEXTURE	smooth	medium grain, sparse	various
		and uneven random	

3. Narrative This section includes the flat and meandering river bed of the Colorado River and the deeply dissected canyons to the north. It differs in landform and vegetation from the surrounding areas. The rock formations and topography are similar to the surrounding areas but it is unique. The river is a major visual intrusion which lies in the middle of this area. The potash plant which lies in the middle of this area is a major visual intrusion which can be seen from several overlooks and the river.

	4. SCORE (Circle appropriate level) *			EXPLANATION OR RATIONALE	SCENIC QUALITY CLASSIFICATION
	HIGH	MEDIUM	LOW		
a. Landform	5	3	1		<input checked="" type="checkbox"/> A - 19 or more <input type="checkbox"/> B - 12-18 <input type="checkbox"/> C - 11 or less
b. Vegetation	5	3	1		
c. Color	5	3	1		
d. Airborne Scenery	5	3	1		
e. Scenicity	5	3	1	See explanation in record	
f. Cultural Modification	2	0	1		
TOTALS	18	5	5	20	

(Instructions on reverse)

FIGURE 3.03: BLM Scenic Quality Field Inventory Form
(Source: USDI BLM, 1986).

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SCENIC QUALITY RATING SUMMARY

Date Aug. 16, 1985District MO06Resource Area G ROAD

1. Evaluators (names)

Bob Turnwater, Russ Grimes, Pete Jordan

SCENIC QUALITY RATING UNITS (1)	Landform (2)	Vegetation (3)	Water (4)	Color (5)	Atmosphere (6)	Scenery (7)	Cultural Resources (8)	Total Score (9)	Scenic Quality Rating (10)	EXPLANATION (11)
001	3	4	5	4	2	2	0	28	A	colorful waterway
002	3	1	0	2	3	2	0	11	C	rolling hills, colorless, little veg.
003	2	1	0	2	3	2	0	10	C	flat, colorless, barren
004	4	3	4	4	3	1	0	19	A	water, scenic cliffs, f. interesting veg.
005	4	3	0	4	4	3	0	18	B	scenic cliffs
006	1	1	0	2	2	2	0	8	C	flat, colorless, barren
007	4	4	5	4	3	2	0	22	A	water, riverside veg, colorful cliffs
008	3	3	0	3	3	3	0	15	B	good mixture of color, topog., f. veg.
009	3	2	0	2	2	2	0	11	C	rough but otherwise monotonous
010	1	2	0	2	3	2	0	10	C	monotonous but good view of NP

INSTRUCTIONS

Form is used in conjunction with the Scenic Quality Inventory and Evaluation Chart.

FIGURE 3.04: BLM Scenic Quality Rating Summary (Source: USDI BLM, 1986).

States into areas called physiographic provinces, each of which has characteristic landforms (Fenneman, 1931; Hunt, 1967; Bailey, 1978). In the continental United States more than 80 such subdivisions are recognized; but for simplification they have been grouped together into 24 major provinces (Figure 3.05).

Site Selection

The six sites evaluated in this study represent the broad range of conditions that affect surface mining operations in the western United States. Not only in terms of reclamation and environmental factors, but administrative and regulatory conditions as well. Five physiographic provinces, each with distinctive landforms and unique environmental characteristics are represented by the sites selected (Figure 3.05). In terms of resource development, the mine sites evaluated are located in the Rocky Mountain and Northern Great Plains Mining provinces (Figure 2.01) and represent three of the five western coal producing regions (Figure 1.01). With regard to administrative control, the sites are located in four western states. The sites chosen for this study also reflect a variety of ownership conditions -- from private

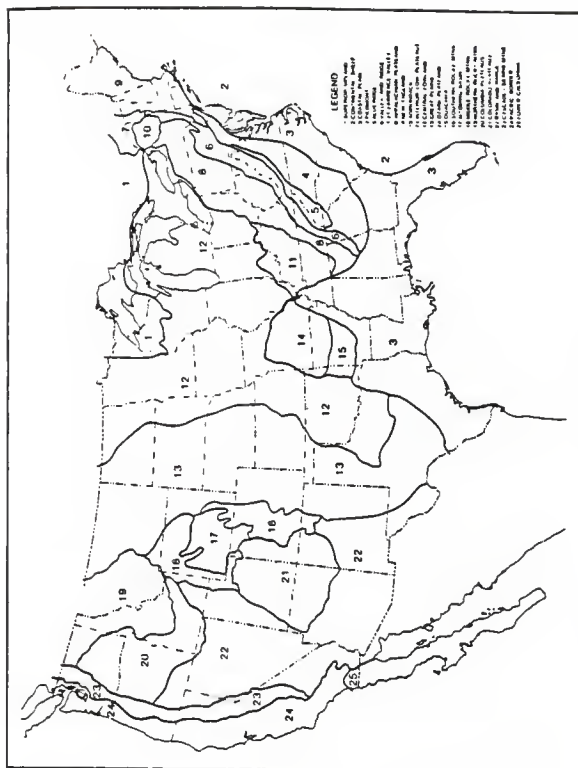


FIGURE 3.05: Physiographic Provinces of the United States (Source: Physiography of the Western United States, Fennemen, 1931).

surface and subsurface ownership to entirely public lands, as well as split estate lands and Indian tribal lands. Site selection is also based on the recommendations of Bureau of Land Management personnel and/or professionals in the mining industry. In addition, corporate enthusiasm and willingness to participate are essential prerequisites to selection. Lastly, each of the six mine sites possess rehabilitated lands of sufficient age, amount and diversity to make an overall assessment of visual quality.

Rehabilitated land and adjacent undisturbed land is evaluated at each of the six surface coal mines selected for this study. Each mine site includes hundreds of acres of rehabilitated land and is usually surrounded by undisturbed land. The selection of representative tracts of rehabilitated and undisturbed lands to evaluate is based on several factors. First, the rehabilitated lands evaluated are generally vast enough to allow unobstructed views of the landscape. Time of rehabilitation is also a consideration. All six of the mine sites contain rehabilitated lands ranging in maturity from those established during the mid-1970's, to tracts seeded within the past few months. Visual quality was measured in areas no less than two years old and no greater than twelve. At each mine site the location of rehabilitated tracts and

the conditions that surround them are determined by the sequence of mining operations. Several rehabilitated areas located throughout the site, preferably some distance from mining operations, and ideally, adjacent to undisturbed land are inventoried at each site. Generally, the areas selected represent the overall visual quality of rehabilitated lands at the site. Selections are also based on the guidance and recommendations of specialists familiar with the rehabilitated landscapes considered.

In addition, at each of the six study sites, undisturbed lands adjacent to the permit area are evaluated for reference. Selection of undisturbed land is based on several criteria. Resemblance to the premining landscape is one of the most important considerations. Proximity to rehabilitated areas is another important factor. In cases where mining operations involve several different recognizable ecotypes, each ecotype is represented in the selection. Where land use includes activities other than grazing, such as farming or rural residential, those uses are represented as well. However, the lands that surround the mine sites included in this study are almost exclusively open rangelands. Because of this, accessibility occasionally limits the selection process.

Procedure

The procedures developed to assess visual quality address three major considerations: 1) legal performance standards; 2) reclamation goals and objectives; and 3) resultant visual quality. Following site selection research activities focus on the investigation of these three topics.

Only after legal obligations and reclamation objectives are identified can visual quality be fairly assessed. Legal performance standards are established by federal and state laws (see Chapter II, Legislation subsection). For each of the four states included in this study, the standards that have the greatest impact on the visual resource are identified and compared. A review of federal standards is included as well (see Chapter IV, Table 4.01). Reclamation goals and objectives are defined in the permit application and reclamation plans for each of the six mines evaluated in this study. Therefore, research procedure also includes a review of those documents (Table 4.01).

Before visual resources are inventoried, area reconnaissance and review of the literature (Fenneman, 1931; Hunt, 1967; and Bailey, 1978) are conducted to

establish familiarity with the landforms and attributes of the physiographic province. The aesthetic character of the physiographic province is the frame of reference used to judge and rate the visual quality of the rehabilitated landscape. If visual resource inventory and/or management classes have been designated by the BLM they are reviewed as well (see Chapter IV, Table 4.02). Once these procedures are completed visual resource inventory data is collected at each study site.

Data collection and sampling

The visual quality of selected rehabilitated land and adjacent undisturbed land is evaluated at each site. The BLM Scenic Quality Inventory and Evaluation process described earlier in this chapter is used to measure visual quality. For each of the seven landscape factors listed (Figure 3.01) numerical ratings are assigned based on established criteria (Figure 3.02). A narrative description (see Appendix B) and photographic documentation accompany the inventory.

The visual resource inventory process took place during June, July, and August of 1988. The inventory data was generally collected during early morning or late

afternoon hours. All visual resource inventory ratings were made by the author.

During initial investigations at the first study site the procedures and methodology were adapted to accommodate actual site conditions. Site reconnaissance revealed that the age, location and quality of rehabilitated land varies somewhat within the permit area. Likewise, the visual character of adjacent undisturbed land varies slightly depending on location, orientation, elevation, etc. Therefore, to best represent the overall visual character of the landscape, three tracts of rehabilitated land and three areas of adjacent undisturbed land are sampled at each study site. (At the third study site only two undisturbed areas were evaluated.)

Adaptation of BLM scenic quality inventory process to study conditions

Originally the Scenic Quality Inventory and Evaluation Chart (Figure 3.02) was used to record visual quality. During evaluations at the first study site the scoring process and rating criteria were modified.

Based on data collected at the first inventory area the rating scales have been refined to include additional

levels of scenic quality. Whole number ratings do not adequately represent the aesthetic diversity present in the landscape. Therefore, plus and minus increments, equivalent to half of a whole number are included (Figure 3.07).

In addition, the rating criteria applicable to the third landscape factor, Water, have been expanded. Flowing or standing water is rarely encountered in the environments studied. With few exceptions, streams are ephemeral and puddles and ponds quickly disappear under the intense western sun. The presence of water, however, is signaled by brilliant green swaths and diverse erosional patterns in the midst of otherwise scorched and barren landscapes. The contrast is unmistakable and in this setting, the suggestion of water has a visual impact as powerful or more dramatic than water in the usual form (see Figure 3.11). Consequently, the rating criteria for Water has been broadened to include the evidence or suggestion of water as described above.

The purpose of this study is to assess the inherent visual quality or essential aesthetic character of the rehabilitated landscape. In the West rejuvenation of the landscape may take decades or even hundreds of years. Mining and production activities currently take place at five of the six surface mines studied. By law,

rehabilitation is contemporaneous with mining (SMCRA, Section 515(b)(16)). Evidence of mining operations is often present in the scenery adjacent to rehabilitated areas. Cultural modifications, such as drill rows, irrigation equipment, monitoring devices, haul roads, machinery, and fencing are also encountered. Although presently quite distinctive, the influence of these factors on the visual quality of the landscape is, for the most part, temporary rather than long-term or permanent. Therefore, in scoring the Influence of Adjacent Scenery and Cultural Modification factors, ratings are based on permanent landscape features only.

Finally, Scarcity, the factor that measures distinctive or especially memorable landscapes has been adapted for the rehabilitated environment. Normally, high scores in terms of scarcity are assigned to landscapes that possess unique scenic qualities not measured by the other six factors. In reference to disturbed or rehabilitated land, however, scarcity cannot always be equated with high visual quality. Severely overgrazed land, clearcut areas, landfills, and abandoned mines, for example, may be scarce or unique within the region, yet obviously discordant. Therefore, zero and negative score values are added to the range of possible scores for Scarcity.

Limitations of the Study

The methodology and procedures described above are used to assess the visual quality of rehabilitated land at six surface coal mines in the western United States. The assessment method is based on the measurement of features within the landscape. Yet visual quality -- the appearance or aesthetic character of the landscape--encompasses much more than the quantifiable values assigned to elements within the landscape. In addition, visual quality, whether measured in terms of constituent parts or assessed as an integrated whole, is also a function of observer participation.

Both the landscape and the observer are dynamic and mutable forces. The landscape is perpetually in flux: from moment to moment as sky, sun, and weather create transient displays; from day to day as seasonal variations are reflected; and from year to year as decades and millennia pass and forces shape and reshape the face of the earth. And, so too with the observer. The landscape we perceive is a reflection of our understanding, mood, background, education, and experience. Human needs and desires change -- just as landscapes change. As we move

through the landscape our perceptions change. So that in essence, both the landscape and the observer represent a momentary experience -- not an objective measurable reality.

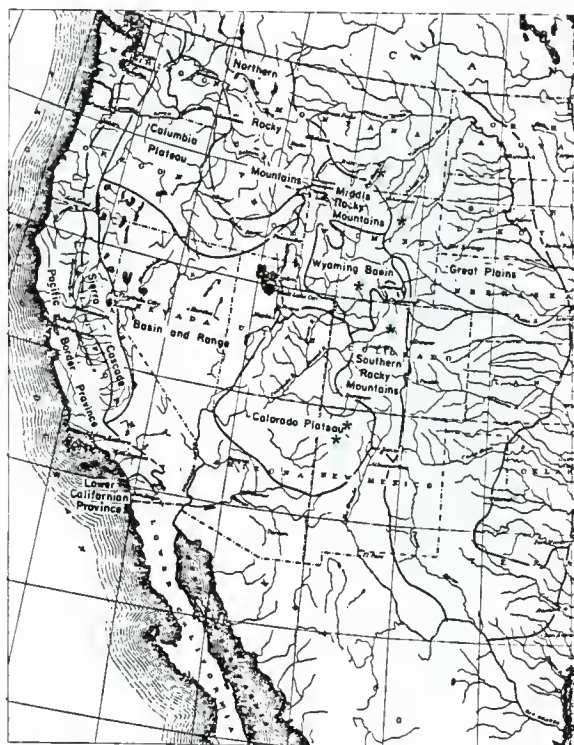
Researchers acknowledge these limitations and at the same time recognize that landscape architects, reclamation specialists, land planners, and decision makers must be able to assess aesthetic values so that they can be properly considered in land-use planning and resource development. In practice, professionals rely on methods and procedures like those described in this chapter to manage the visual resource.

How then can the limitations be surmounted? If the time and financial resources were available, a large sample size, and multiple observers and observations would increase the certainty and consistency of this assessment, and others like it. Extensive research parameters, however, are beyond the scope of this study and complete exploration of the topic is left to future studies.

Study Sites

Study Site One

The first study site is located within the Navajo Section of the Colorado Plateau Province (Figure 3.06). In the eastern part of the Navajo Section the San Juan mountains to the North, the Chuska Mountains along the Arizona and New Mexico border, and the San Pedro and Zuni mountains to the east and south form the San Juan Basin. Structurally, the basin resembles a series of stacked saucers that become increasingly smaller towards the top, where Tertiary and late Cretaceous coal-bearing formations outcrop. In contrast to the highly dissected plateaus, deep meandering canyons, steep slopes and colorful cliffs that characterize the greater plateau province, the San Juan Basin contains broad flat shaley formations separated by low cuestas and sandstone outcrops. Bad lands, dry washes (arroyos), walled canyons, horizontal rock terraces and escarpments, and the mesas and mountains that fringe the basin are the most distinctive landscape features (Hunt, 1967).



* Study Sites

FIGURE 3.06: Physiographic Map of the Western United States (Source: Physiography of the United States, Hunt, 1967).

Landform

The landscape that surrounds the study site is typical of the greater basin area. To the north and west, distant mesas, buttes and mountains form simple horizontal masses that frame views within the study area. To the south, the San Juan River terraces and stark embankment dominate the scenery. These distant views, with occasional rock outcrops, hogback formations, resistant buttes, and the green flood plain, are the elements that create variety in the distant landscape. The most conspicuous aspect of the landscape, however, is the uniformly flat topography (Figure 3.07). To this, bare sandstone surface formations, pale soil, and the dry, sandy arroyo add subtle complexity. Gentle slopes and elevation gains occasionally allow panoramic views of the study area. Outstanding topographical features, such as colorful badlands, massive rock outcrops, and mesa faces, which are common in other areas of the basin, are not encountered within or immediately adjacent to the permit area.

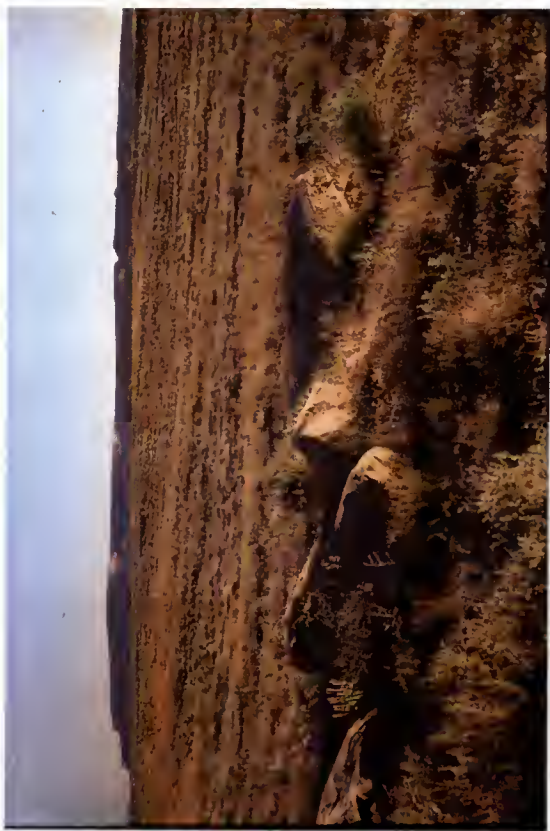


FIGURE 3.07: Study Site One, Rehabilitated and Undisturbed Land (photo by author, 1988).

Vegetation

Like the landform, the vegetation in the area is also relatively uniform and nondistinct. The vegetation type belongs to the Grama-Galleta ecoregion classification (Bailey, 1978). Salt tolerant species, such as *Sporobolus airoides* (alkali sacaton), *Hilaria jamesii* (galleta), *Oryzopsis hymenoides* (indian rice grass), *Gutierrezia sarothrae* (broom snakeweed), and *Atriplex* sp. (four-wing saltbush and shadscale) predominate. The arroyo hosts the most green shrubby forms. Around the arroyo *Sarcobatus vermiculatus* (grease wood), *Tamarix pentandra* (saltcedar tamarisk) and *Gutierrezia sarothrae* cluster. Wildlife, including jackrabbits, birds and lizards gather around the arroyo as well.

The reader should note that conditions during the evaluation period (summer, 1988) were extremely dry. In any year, however, the intense heat of the desert sun is inescapable; and as the sun rises, the flat, baked, spartan appearance of the landscape is exaggerated.

Rehabilitated landscape

The rehabilitated land at the study site conforms in quality and character to the standards dictated by New

Mexico state and Federal reclamation laws (Table 4.01).

Consequently, the topography is uniformly smooth, gently undulating or nearly flat. Where pre-existing landform and mining operations provide sufficient amounts of overburden, the material is regraded into large mounded hills with slopes that carefully blend into off-site contours.

In keeping with the declared post mining land-use (grazing), native forage species dominate the vegetation mix. Some of the most noticeable species include: *Sporobolus cryptandrus* (sand dropseed), *Atriplex canescens* (four-wing saltbush), *Sporobolus airoides*, *Hilaria jamesii* and *Oryzopsis hymenoides*. The appearance and diversity of the vegetation vary somewhat depending on the length of time since seeding (maturity). The seed mix has been adjusted and refined since the first revegetation efforts. Although density appears to be relatively uniform throughout the site, the thick green appearance of more recent reclamation (often due to *Salsola kali* [russian thistle]) is gradually replaced by sparser grasses and greater differentiation as the vegetation matures.

The otherwise uninterrupted line of the landform is occasionally broken by rockpiles constructed for wildlife habitat. The placement, size and configuration of the

rock piles appears random, but their presence is fairly significant given the monotony of the surrounding landform. The wildlife observed at this site, incidentally, was seen in close proximity to these constructs.

In addition, cobbles have been spread in some areas to mimic off-site surface texture. The technique is employed in visually sensitive areas along major roads where rehabilitated land is directly adjacent to undisturbed land. Contrast is minimized.

Run-off and sedimentation control requirements necessarily prevent the reconstruction of desert arroyos. Because precipitation in the area is limited, reconstructed drainage ways are rare or inconspicuous. At this study site, however, one major drainage diversion has been constructed. The appearance and configuration of the diversion is a reflection of state and federal engineering standards. Its dimensions are dictated by 100 year storm flood potential, and it is therefore much wider and more uniform than the desert arroyo. Much of the interior surface is lined with erosion control materials. The diversion bisects the site and is surrounded by mining operations. Even during the drought-like conditions experienced as this evaluation was being conducted, green vegetation thrives around the diversion.

The coal mined at this site is used nearby to generate electricity. Consequently power lines and poles are noticeable both on and off the mine site. Because the landscape is treeless and overwhelmingly flat these elements are quite distinctive.

Study Site Two

The second study site is located on Navajo tribal lands approximately 30 miles south of the first study site and shares many of the scenic attributes described above. Rehabilitation at this site is complicated by harsh environmental conditions. Average annual precipitation amounts to six inches and is sometimes as low as two. Badlands, sandstone escarpments and dry, sandy washes predominate. Grassland vegetation is sparse; in many places cover does not exceed five percent, and top soil is minimal. In addition, much of the range land has been severely over-grazed and desirable forage species eliminated.

The permit area covers approximately 16,867 acres and consequently encompasses a broad range of scenic elements. Examples of some of the region's most distinctive landforms are found adjacent to or in close

proximity to rehabilitated areas. Highly eroded shale and sandstone badlands, ranging in color from charcoal and white neutrals to earthy pastels offer striking contrast to the flat parched grasslands. From some vantage points huge resistant rock masses dominate the mesa. Vegetation in the badlands is limited to isolated forms struggling alongside bare rills and gullies. Elsewhere vegetation is meager, except along the arroyos where riots of green feathery forms cling.

In addition to natural diversity, the landscape at this study site is significantly influenced by cultural patterns. Most notable are the large green geometric displays created by irrigated crops. The arched transmission lines that rhythmically punctuate the landscape in every direction are hardly less noticeable. In the background, the homes and trappings of native Navajos seem to grow out of or dissolve into the broad flat mesa top.

Vegetation

Vegetation native to the study includes many salt and drought tolerant species. Shrubs include *Atriplex* sp. and *Chrysothamnus* sp. (rabbitbush); *Atriplex*

confertifolia (shadscale) dominates. Dominant grasses are warm season varieties, *Hillaria jamesii* (galleta), and *Sporobolus airoides* (alkali sacaton) included. *Oryzopsis hymenoides* (indian rice grass) is the only cool season grass of significance. Forbs include *Salsola kali* (russian thistle/tumbleweed) and *Sphaeralcea grossulariaefolia* (globe mallow). Since the primary post mining land use at the study site is rangeland, many of the plant species noted above are established on the rehabilitated land. Among the most apparent are: *Sporobolus cyrptandus* (sand dropseed), *Agropyran smithii* (western wheatgrass), *Atriplex canascens* (four-wing saltbush), *Bromus tectorum* (cheatgrass), *Oryzopsis hymenoides* and *Salsola kali*.

Rehabilitated land

The rehabilitated parcels evaluated at this site range in size, maturity and location, but exhibit similar visual quality. The oldest benefit from mature green vegetation (four-wing saltbush and saltcedar tamerisk), and patterns created by bare soil, surface runoff and species differentiation. Wildlife (coyote, jackrabbits, birds) also enhance the landscape's character.

Rehabilitated land in some areas is directly adjacent to undisturbed land and quite expansive. In those areas it is sometimes difficult to distinguish between the rehabilitated land and the rangeland it borders. Furrows and dikes that were once favored as erosion control measures, ring the slopes and identify the rehabilitated land. Throughout the site, rehabilitated land has a bold, simple curvilinear quality. On this, dry straw colors are sometimes striated with pale olive drifts. The visual quality of the prominent yet gently sloping rehabilitated hillsides benefits from the multifaceted scenery off site.

Study Site Three

In central and south central Wyoming the Wyoming Basin interrupts the middle and southern Rocky Mountains (Figure 3.06). The plains between the Laramie and Bighorn Mountains connect the Wyoming Basin to the Great Plains Province to the east. Similarly, to the west, near the Vintah Mountains, the basin is continuous with the Colorado Plateau Province. In entirety the Wyoming Basin covers approximately 42,300 square miles (Bailey, 1978). Surrounding mountain ranges, linear uplifts and isolated

mountains within, divide the Wyoming Basin Province into several distinct sub-basins.

The third study site is located in the Hanna Basin. The Shirley and Freezeout Mountains on the north, Sierra Madre and Medicine Bow Mountains on the south, and the Rawlins Uplift to the west enclose this part of the province. Topographically, the area is characterized by flat to gently rolling plains, with exposed, steeply dipping outcrops (hogbacks) and numerous elongated parallel ridges. Predominating in the north and central part of the basin are hogback ridges and rugged broken terrain bisected by numerous drainages (breaks). In the south and southeast, gently rolling topography with elongated parallel ridges dominates. Two perennial streams and smaller intermittent streams flow through the basin. The majority are narrow and deeply incised.

Undisturbed Landscape

In the study area, upland sage brush-grass (Sagebrush-Wheatgrass ecoregion [Bailey, 1978]) is the dominant vegetation type. *Artemisia tridentata* (big sagebrush), *Crysothamnus vicidiflorus* (douglas rabbitbush), *Atriplex confertifolia* (shadscale), and

Symphoricarpos occidentalis (western snowberry) are the primary overstory species. The perennial grass understory includes *Agropyron* sp., *Oryzopsis hymenoides*, and *Stipa* sp. (needlegrass). Along the draws and drainages, and in the wet bottomlands the sagebrush grows largest and vegetative productivity is highest. Where salinity is high, *Sarcobatus vermiculatus* (black greasewood), *Sitanion hystrix* (bottlebrush squirrel tail), and *Elymus cinerus* (wild rye) are also common. In the steep rocky (rough break) areas, shrubs are widely dispersed and the grass understory is sparse. *Artemisia tridentata* in combination with *Atriplex* species dominates, but barren areas are common.

The undisturbed areas evaluated exemplify the various vegetative and topographical types outlined above. The rough break landscape is rugged and complex--horizontal, but not flat, rather pleated or folded. Crumbling blocks of stacked sandstone interspersed with sparse vegetation cover the ridges. The vegetation, although low (usually no more than knee high) is relatively woody. The best specimens (greenish, tallest, and thickest) are found wherever moisture collects. The rocks, the shrubs, the grasses and soil create a kaleidoscope of colors, textures, and forms. The ridges are highly visible and the foreground captivating, such

that adjacent scenery is hardly noticed. In contrast, the upland sage/grass area evaluated, revels with panoramic views. This landscape resembles a great sea of sage. Distinctly lush bands of vegetation sweep the drainage ways, creating great swirling patterns that are only occasionally interrupted by rocky or ridged masses. Wildlife (pronghorn antelope, rabbits, birds) is abundant and frequently gathers where moisture gathers -- near small sheltered ponds. The views are unrestrained by man's imprint. The roads and rail, and powerlines which accompany them, go unnoticed.

Rehabilitated landscape

In areas of recent rehabilitation, thick grasslands replace the sage seas. The revegetation seed mix reflects an emphasis on grass and browse species appropriate for cattle and wildlife. Grasses comprise approximately 70 percent of the mixture; *Agropyron* species (wheatgrasses) predominate. The major species seeded include: *Agropyron smithii* (western), *Agropyron dasystachyum* (thick spike), *Agropyron spicatum* (bluebunch), *Agropyron trachycaulum* (slender) and *Agropyron intermediate* (intermediate). To this *Oryzopsis hymenoides* is added. On parcels of greater

maturity, pale green *Atriplex* species thrive above the grasses. *Atriplex canescens* and *Atriplex confertifolia* are the major shrub species seeded. Vegetation is thick and uniform throughout most of the site. Bare soil is minimal. Among the species noticed are: *Oryzopsis hymenoides*, *Agropyron cristatum* (crested wheatgrass) and *Agropyron trachycaulum*, *Atriplex* sp. and *Sitanion hystrix* (bottlebrush squirrel tail).

Rehabilitated land at the site fills gaps between hogbacks and rough break ridges. The edge where maturing vegetation meets the undisturbed ridge line becomes diffuse over time. The natural thickening of vegetation on north facing slopes emphasizes the folded land forms. The rehabilitated land, although flat or gently sloping, has a subtle overlapping or seesaw quality. Throughout the site boulders have been piled to replace the rocky habitats displaced by gently rolling grasslands. These rock deposits are large enough to provide cover for non-burrowing animals and high enough for roosting and nesting habitat. In one instance a highwall segment has been preserved which resembles premining landforms and provides additional wildlife habitat (Figure 3.08). Small sedimentation basins (some partially drained) also add topographical diversity. Mining operations and rehabilitation activities at this site have been



FIGURE 3.08: Study Site Three, Highwall Remnant

completed. Man-made influences are limited to maintenance roads and monitoring equipment.

Study Site Four

The fourth study site is located in the southern part of the Wyoming Basin province where the Waskakie Basin extends southwards toward the Park Range (Figure 3.06) between the Waskakie Basin and the Park Range. Cutaceous and Tertiary Strata forms cuestas and long valleys drained by the Yampa River and its tributaries. Gently rolling low land hills characterize the Yampa River drainage system. South of the Yampa River the smooth moderately sloping hills increase in elevation and grade. The Williams Fork Mountains form the southern boundary of the sub-section. To the east, towards the Park Range, landscape diversity increases. The low rolling hills south of the Yampa River extend into open, park-like areas east of the Williams Fork Mountains (Twenty-mile and Eckman Parks). The transition between the Williams Fork and Park Range Mountains is marked by these park lands. East of the parks scattered mountains indicate the beginning of the Park Range.

The rolling hills in and around the Yampa River and its tributaries are covered with grasses and sage. To the south and west, as elevation increases, small shrubs and scrub oak become more abundant. In terms of both vegetation and topography north and south facing slopes differ significantly. Vegetation on south facing slopes is sparse and erosion exposes horizontal cliffs of sandstone, shale, and coal. In contrast, north facing slopes are more uniformly covered by vegetation and exhibit less erosion and dissection. Coal mining is extensive in the region, and most mines are located within the Williams Fork Mountains and the adjacent park lands.

The study area is south of the Yampa River along the western edge of Twenty-mile Park and the northern edge of the Williams Fork Mountains. Steep uniform slopes range in elevation from approximately 7,000 to 8,000 feet. The ridged slopes orient to the west and resemble mesas. Erosion reveals banded rock outcrops along the "mesa" edges that add diversity to the landscape. Several small ephemeral streams flow through the area.

Undisturbed land

Vegetation at the study site varies with elevation

and topography. Coverage is uniformly dense in some places, sparse and patchy in others. On well-drained lower slopes and ridges (Upland sagebrush mosaic), low shrubs (including *Symphoricarpos oreophilus* [snowberry]) and *Artemesia tridentata* dominate. A small percent of grasses and forbs are also present, including: *Agropyron trachycaulum*, *Stipa comata* (needle and thread grass), *Lupinus* sp. (Lupines), and *Balsamorhiza* sp. (balsamroot). On north slopes and high ridges *Quercus gambelii* (gambel's oak), *Prunus virginiana* (common chokecherry), and *Amelanchia alnifolia* (serviceberry) dominate (mountain shrub/mixed brush mosaic). On higher north facing slopes, in draws or in sheltered areas *Populus tremuloides* (quaking aspen) is the major overstory species. Within these areas the understory consists of the mixed brush associations described above.

The undisturbed lands evaluated represent the vegetative types outlined above. Narrow sloping valleys adjacent to the mine site are typical of the regional topography. High on the ridges and hills that shelter the valleys aspen stands are surrounded by oak and chokecherry. The ridges are characteristically banded with light sandstone cliffs. Below, sage, low shrubs and sparse grass stubble covers the valley floor. A complex tapestry of color, line, texture, and contrast is created

by the diversity and differentiation in vegetation and landform (Figure 3.09). Although the visual qualities of each ecotype is distinct, they weave harmoniously through the landscape scene. Distant views of the parklands and river valley below further enhance the scene. The transmission towers so typical of the western landscape stomp across these lands as well. Their impact varies depending on vantage point and topography. With this exception, cultural modifications to the undisturbed landscape are limited.

Rehabilitated land

Rehabilitated land at the fourth study site shares many of the qualities of rehabilitated land elsewhere in the West. The topography at this site, however, while generally smooth and undulating, is steep. In addition, the mined lands are at an elevation much greater than the surrounding environs. Rehabilitated land appears from the distance as a smooth and grassy mountainside park. The landforms mimic the complexity of the surrounding undisturbed terrain in the sense that crests and ridges enclose lower, sheltered areas. While similar in character and overall form the ruggedness and spontaneity



FIGURE 3.09: Study Site Four, Upland Sage/Aspen Ecotype
(photo by author, 1988).

of the landscape as a whole has been tamed considerably. None of the parcels evaluated can be characterized as low, flat or rolling; yet all of them are essentially simple, uniform rolling hills. Interestingly, the slopes of pre-SMCRA parcels have textured mogul-like slopes, instead of the usual cropland conformity (Figure 3.10). These areas have a subtly sculpted appearance. The visual quality of all the areas evaluated is augmented by distant views made possible by the high sloping relief and lack of mature vegetation.

The focus of rehabilitation efforts at this study site is to provide grazing lands and wildlife habitat. In fact, grazing cattle already dot the rehabilitated landscape. Consequently grasses predominate. Several seed mixtures with varying seed ratios are used, but *Agropyron* (wheatgrass) species, including *Agropyron intermedium*, *smithii*, *trachycaulum*, and *dasystachym* are seeded in many areas. Typically, other grasses such as *Bromus marginatus* (mountain brome) or *Bromus inermis* (smooth brome), *Elymus* sp. (wildrye), *Poa* sp. (bluegrass) and *Stipa* sp. (needle grass) are added. Various forbs and *Medicago* sp. (alfalfa) complete most of the mixes. Species noted in one evaluation area include: various *Agropyron* species, *Dactylis glomerta* (common orchardgrass), *Poa pratensis* (Kentucky bluegrass), *Festuca*



FIGURE 3.10: Study Site Four, Pre-SMCRA Rehabilitation and Pond (photo by author, 1988).

(tall fescue), *Bromus marginatus* and timothy grass. *Salsola* sp. (thistle), *Linum* sp. (flax), *Medicago* sp., *Astragalus* sp. (vetch), *Achillea* sp. (Yarrow), mullen and sunflower, as well as *Artemesia* and *Populus tremuloides* were also apparent. The shrub and tree seedlings are clustered yet still relatively inconspicuous among the grasses and forbs.

Runoff from the slopes is collected in long narrow drainage ways. To check erosion some of the drainage ways are conspicuously lined with rock and hay riprap--others are less distinct. The trees, green shrubbery and thick grasses that normally soften drainage ways are missing from the rehabilitated land at this time. At the base of the drainages, water collects in sedimentation ponds that add welcomed diversity to the landscape--sometimes mirroring the surrounding slopes.

Currently, the rehabilitated land within the permit area differs dramatically from the undisturbed lands nearby (including undisturbed lands that are left as "islands" within the rehabilitated parcels) (see Figures 3.09 and 3.10). While rehabilitated landforms are homogenized, the lack of mature overstory and shrub species is perhaps the most significant difference. In any case the contrast between the two landscapes makes a significant visual impact.

Study Site Five

The Great Plains Province is the setting for the fifth study site (Figure 3.06). The region which surrounds the site is identified by Fennemen as the "Unglaciaded Section of the Missouri Plateau (Fennemen, 1931). In this section of the province major tributaries of the Missouri River (among them the Powder River) are connected by upland basins. The Missouri River breaks in the north, the Hartville Uplift on the south; the Blackhills to the east and the Bighorn Mountains to the west define the Powder River Basin. The majority of the basin is characterized by rolling plains and table lands. Throughout the region scoria remnants are scattered above the plains. On the northern margin of the basin rough breaks flank the Missouri and Yellowstone Rivers. Sandstone ridges and cliffs are evidence of the rivers' work. East, towards the black hills, eroded cuestas and rough, broken, scoria-capped hills are characteristic. Near the Bighorn Mountains in the West, scoria and sandstone cuestas again become more prominent. The study site is located on the eastern flank of the Powder River Basin. The plains here are notably flat; slopes average

around four percent. The Belle Fourche River and its tributaries drain the area considered. Grasses and sage cover the rolling hills.

Vegetation types

Dryland steppe (shortgrass prairie) is the characteristic vegetation type. Short bunched grasses are sparsely distributed over the landscape. The Wheatgrass-Needlegrass mosaic predominates (Bailey, 1978). *Agropyron smithii* (western wheatgrass), *Bouteloua gracilis* (blue grama) and *Stipa* sp. (needlegrasses) are common associated species. Two vegetation types within the shortgrass mosaic occur in and around the permit area. The sagebrush/grassland type consists of the grasses noted above, along with lesser densities of shrubs and forbs (typically *Artemisia tridentata* and *Carex filifolia* [needleleaf sedge]). In the bottomlands along the intermittent and ephemeral drainage ways of the Belle Fourche River, *Artemisia cana* (silver sagebrush) and *Poa juncifolia* (bluegrass) thrive in addition to the common short grass species. The rangelands adjacent to the permit area are dominated by *Artemisia tridentata* and the shortgrass species. Where disturbance has occurred

Salsola iberica (russian thistle) is common. On nearby agricultural lands, *Agropyron cristatum* (crested wheatgrass), *Medicago sativa* (alfalfa) and *Bromus inermis* (smooth brome) are cultivated.

Landscape diversity

At this study site landforms and land uses both determine visual quality. The low, rolling terrain typical of the Great Plains Province characterizes this landscape as well. Isolated hills, however, frequently break the horizontal plains' continuity. The resistant scoria remnants with brick and charcoal colored tops resemble dwarfed volcanoes. Their presence in the landscape is abrupt, but their shape is usually smooth and graceful. Pasture and croplands surround the scoria hills, resulting in a distinctive patchwork patterning. The utilization of the land for agriculture is accompanied by other cultural modifications. To one degree or another the visual quality of all the lands evaluated is impacted by fences, roads, litter, utilities, livestock, traffic, residential and commercial structures, and other forms of landscape disturbances. The resultant images vary from picturesque (a windmill surrounded by grazing horses for

example) to offensive (litter strewn roadway with tasteless signage). In some cases, the visual impact of these elements is significant.

In terms of natural diversity, the creek drainages are undoubtedly the most significant landscape feature (Figure 3.11). Drainage ways meander across the plains, cutting dramatic sandstone scarp faces that can often be seen from miles away. Though flowing water seldom accompanies the channel, the brilliant green vegetation, in conjunction with the bleached scarps and dusty table lands is captivating.

Rehabilitated landscape

Abbreviated versions of the meandering stream beds have been created in the rehabilitated landscape (Figure 3.12). Although the Wyoming Department of Environmental Quality disallows steep scarp faces, the meandering, terraced character of natural drainages is subtly reconstructed. Rehabilitated tracts of varying maturity surround the creek bed. Topography varies; among the more pronounced is a steep sided hill that flattens into the creek bottom (Figure 3.12). Broad valley-like corridors also wind between the gentle ridges and hills. From now



FIGURE 3.11: Study Site Five/Ephemeral/Intermittent Creek
(photo by author, 1988).



FIGURE 3.12: Study Site Five, Reconstructed Drainageway
(photo by author, 1988)

elevated vantage points on the perimeter of the permit area low rolling hills stretch into the distance. Mature rehabilitated tracts that border the site are difficult to distinguish from the adjacent unmined lands. Wildlife is abundant. Antelope apparently relish the rehabilitated grass mixture. Duck, coyote, birds, and grazing cattle were also observed. In an aesthetic sense, grazing cattle create interest and focus, but grazing is an important grassland management strategy as well.

The gently rocking terrain is covered by finely textured grasses. They are generally thick and uniformly distributed. A densely matted cushion of dry fibers clings to the base of the grass stalks and obscures the soil. Straw and hay kindling colors are interspersed with green fingers that drift up drainage ways. Drought conditions prevailed during the study period. Ashen skies caused by fires in the western part of the state and drought conditions dimmed the sparkle of the landscape.

Revegetation

Various seed mixes are planted on the rehabilitated slopes. A combination of *Agropyron smithii*, *Stipa viridula* (green needlegrass) and *Bouteloua gracilis* (blue

grama) forms the primary mix. Supplemental shrub plantings are arranged in groups (mosaic plantings); included are: *Artemisia tridentata*, *Chrysothamnus nauseosus* (rubber rabbitbrush) and *Atriplex canescens*. Along draws and bottomlands *Poa* species (bluegrass) is added. A pleasantly unorganized jumble of grasses, forbs, and waist high shrubs (*Atriplex* sp.) occupies the oldest tracts. Some of the species noted in other areas were *Agropyron cristatum* and *Agropyron trachycaulum*, *Bromus inermis*, *Medicago* species and *koshia*.

The rehabilitated landscape is not without man's more obvious modifications. Everywhere the usual complement of power poles, rock piles, fences and haul roads confounds the simple repose of the landscape.

Study Site Six

The sixth study site is located in the north central part of the Powder River Basin, thirty miles south of the Yellowstone River. The Bighorn Uplift on the southwest, the Blackhills to the southeast, and the Porcupine Dome and Miles City Arch in the north define the Basin's perimeter. The Yellowstone River and its tributaries drain the area. This part of the Powder River Basin

shares many of the characteristic landform and vegetation types described above (see Study Site Five). In contrast with the southern reaches of the Basin, however, topographical relief and vegetation within the northern section becomes increasingly diverse. In this region horizontal sedimentary layers have eroded to form a landscape of dissected plateaus, rough breaks, flat valleys and rolling plains. The hard sandstone and scoria capped ridges form high benches, while the easily eroded shales form gentle slopes or badlands.

Landform and vegetation

Near the study site, the gently rolling terrain which occupies the valley bottoms, is flanked by high ridges. Bluffs and outcroppings of resistant sandstone and scoria (clinkers) distinguish the ridges. (Scoria is formed by the natural burning of coal beds along their outcrops.) To the west of the permit area elevation climbs steadily into the Little Wolf Mountains.

The vegetation communities identified within the study area are the sagebrush-grassland (short-grass prairie) group described earlier (see Study Site Five), and the eastern ponderosa pine subgroup (Kuchler, 1964),

as well as transitional zones between them. Grassland communities are the most prevalent; the associated species commonly include: *Stipa comata*, *Koeleria cristata* (prairie junegrass), *Schizachyrium scoparium* (little bluestem) and *Carex filifolia* (threadleaf sedge). Within the shrub-grassland communities *Agropyron* species (wheatgrasses) are also common. *Artemesia tridentata* and *Artemesia cana*, and *Rhus trilobata* (skunkbrush sumac) are the primary overstory species in the shrub-grassland community. Timber stands in the region are dominated by *Pinus ponderosa* (ponderosa pine) with *Rhus trilobata*, *Agropyron spicatum* (bluebunch wheatgrass) and *Calamouilfa longifolia* (prairie sandseed) understory.

The visual quality of the undisturbed lands changes as elevation increases. Vegetation type and distribution changes accordingly. At the highest elevations, steep rocky hillsides with prominent scoria and sandstone buttes are covered with thick stands of ponderosa and barren or sparsely vegetated soils. Contrast in terms of color and forms is lively. The dark green conifers, blushed scoria, and buff sandstones warm the landscape. The mountains and layers of vegetation follow irregular jagged lines yet are peacefully cohesive. As might be expected, textures are also diverse. At lower elevations these elements become the distant backdrop while rolling farmlands

dominate the foreground. The juxtaposition of rugged landscape and pastoral scenes is striking. The uncultivated lowlands, so often characterized as rolling, possess a scraped quality just short of rolling. The most salient landscape quality is the distinctive complement between vegetation and topography. Patterning and contrast is most arresting where vegetation follows drainages and on slopes that reveal a clear procession of vegetative types.

Rehabilitated lands

Mining operations at this site progress up the valley bottom and flanking ridges. For the most part the rehabilitated lands evaluated are located on the slopes that rise to meet the ridge line. The lands all share a gentle, undulating quality. And in most cases, the evaluated lands are uniformly clothed in dense grasses. On the site's perimeter rehabilitated lands are meticulously matched to the existing terrain. Recently established ponderosa and sage seedlings mingle with the grasses -- almost shadowed by the mature stands close by (Figure 3.13). Grazing herds of buffalo, windmills, and retaining ponds filled with bass relieve the uniformity.



FIGURE 3.13: Ponderosa Seedlings
(photo by author, 1988).

One pine-topped high wall segment is being preserved for raptor habitat. It promises to recapture scenic as well as wildlife diversity. The occasional cottonwood clumps (*Populus deltoides*), sage and pine seedlings, and the moisture loving plants that linger near the sediment ponds are surrounded by grasslands.

Revegetation

At this site grassland seed mixes are also formulated to include the diversity that occurs in the premining landscape. Many mixes with various grass forb and shrub ratios have been devised. The grasses common to nearly all areas are: *Bouteloua* sp. (sometimes *curtipendula* [sideoats grama]), *Agropyron* sp. (wheatgrasses), *Stipa* (needlegrasses), with *Oryzopsis* sp. (ricegrass), *Koelesia* (junegrass), *Poa* (bluegrass), *Calamouilfa longifolia* (prairie sandseed) and *Schizachyrium scoparium* (little bluestem) sometimes added. Forbs, *Rhus* and *Juniperus scopulorum* augment the mixtures. Not surprisingly, the *Agropyron* species (wheatgrasses) are often the most prominent. But flowering forbs (including *Linum* [flax], yellow clover, shrubs (including *Atriplex canescens* on older reclamation), juniper seedlings, and

moisture loving plants (cattails, squirreltail, and *Populus deltoides*) thrive in their selected niches.

With the exception of facilities and mining operations, the man-made elements at this site impart positive visual qualities to the surrounding lands. The mountainous background and dark tree fringed ridges lend a positive influence as well. The thick uniform grasslands seem luxurious. Unquestionably, the appearance of this landscape reflects its intended purpose -- grazing.

CHAPTER IV

RESULTS

In this chapter, findings derived from the methodology discussed in Chapter Three are presented. The chapter is organized around the following topics. First, the results of statistical comparison between the scenic rating scores assigned to Rehabilitated and Adjacent Undisturbed Land is outlined. This section also addresses the statistical significance of these findings. Next, an analysis of these findings, beginning with an interpretation of the results is presented. Further statistical evaluation of the relationships suggested by the findings is also included. The purpose of the analysis section is to: 1) clarify the nature of differences between the overall scores, 2) identify how the seven landscape factors measured relate to the overall outcome and 3) highlight issues implied by the findings. In conclusion, supplemental material is presented for reference. First, an outline of applicable state performance standards and industry objectives that directly relate to the visual quality of the rehabilitated lands is furnished. And finally, pre-existing BLM Visual

Resource Inventory/Management class designations for each study area are summarized.

Statistical Evaluation of Data

To assess the visual quality of rehabilitated land, the total scores for Rehabilitated Land are compared with the scores for Adjacent Undisturbed Land using a Student's t-statistic (T-test for small independent samples). The T-test is used to determine whether there is a difference between Rehabilitated and Adjacent Undisturbed Land. This test measures the difference between the groups by comparing the average scores (means) for visual quality of both groups. (The mean or average scores are noted as \bar{X}_r for Rehabilitated Land and \bar{X}_u for Adjacent Undisturbed Land.) The T-test also measures the variability (i.e., standard deviation) of the two groups. The size of variability in each group and the similarity of variability in both groups are compared. In this case, variability among the scores for Rehabilitated and Adjacent Undisturbed Lands tells us about the homogeneity of the landscapes. (Standard deviation is noted as $std._r$ and $std._u$.) The statistical significance of differences in the scores is based on the probability (noted as p) of

obtaining those results by chance. Results that would occur by chance less than five times out of 100 are traditionally considered significant. (Statistically significant results are noted as $p < .5$.) (For further discussion see Agnew and Pyke, 1987.)

Findings

The average scores for Rehabilitated Land and Adjacent Undisturbed Land are 7.69 ($\bar{X}_R = 7.69$) and 10.21 ($\bar{X}_U = 10.21$) respectively. The assessed variability for Rehabilitated Land is 7.68 ($\text{std.}_R = 2.77$) compared with 12.90 ($\text{std.}_U = 3.59$) for Adjacent Undisturbed Land. Statistical comparison of these measures using the T-test described above suggests that the two groups differ significantly (For $df = 33$, $p < .05$). The comparison indicates that, between the two groups, the average ratings for visual quality and the variability of the ratings are unlikely to occur by chance alone. This suggests differences in the scenic quality and the homogeneity of the two landscapes. (See Appendix C.)

Analysis

The results described above indicate that the rehabilitated lands evaluated are significantly less scenic than the adjacent undisturbed land included in this study. In addition, measures of the variability within each group suggest that the Rehabilitated Lands are visually less diverse than the Adjacent Undisturbed Land.

Comparison of Landscape Factors

One of the objectives of this study is to identify how factors within the rehabilitated landscape influence visual quality. (See Research Intent Subsection, Chapter III.) With that goal in mind, scores for each of the seven landscape factors measured are compared in the manner described above (see Appendix B). For convenience the results are displayed graphically in Figure 4.01. Of the seven landscape factors measured, the greatest disparity between Rehabilitated and Adjacent Undisturbed Land is exhibited in the ratings for Landform (For $df = 33$, $p < .05$). Both mean scores and variability differ significantly (see Appendix B). These findings suggest that topographical diversity within and between the Rehabilitated Lands is significantly less than that

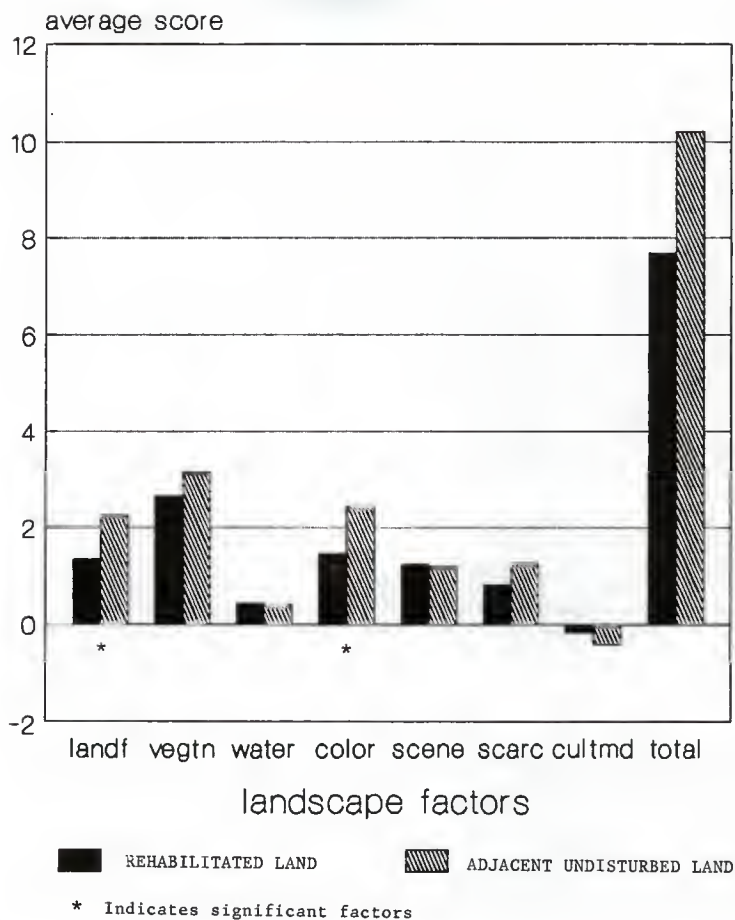


FIGURE 4.01: Visual Quality Rating Graph.

measured for Adjacent Undisturbed Land. With the exception of Color (see discussion below), none of the other landscape factor scores exhibit a statistically significant level (probability less than .05) of disparity. These results imply that the difference between the visual quality of Rehabilitated and Adjacent Undisturbed Land is primarily a function of Landform (i.e. topographical character, see Figures 3.01 and 3.02 for specific criteria). In light of this analysis the notion of a positive relationship between topographic variety and high visual quality is supported.

Color and Interaction Effects

The ratings for Color in the landscape also differed significantly between Rehabilitated and Adjacent Undisturbed Land (For $df = 33$, $p < .05$) (see Appendix B). Color, however, is intrinsic to each of the other landscape factors. Consequently, the difference in Color scores may suggest potential interactions among the seven landscape factors -- in addition to (or rather than) disparity between the Rehabilitated and Adjacent Undisturbed Lands. An analysis of the potential interaction between landscape factors would be useful as a

predictive tool, but is, unfortunately, beyond the scope of this study. The analysis of differences in total scores assigned for each landscape factor (particularly Color), do however, suggest that relationships between the seven factors may exist.

Supplementary References

An analysis of the results of this study would not be complete without a brief summary of the standards and objectives which necessarily define those results. Table 4.01 outlines state and federal reclamation performance standards and industry objectives. The Table includes the major regulatory requirements that relate to resultant visual quality. Data applicable to each of the six study sites is listed. The conclusions drawn in the final chapter integrate this information, as well as the findings and analysis presented earlier.

[illegible]

ISSUING AGENCY	ENFORCEMENT AUTHORITY	TITLE OF ACT(S)	REGULATION	HYDROLOGY	LANDFORM	VEGETATION	LAND-USE	CULTURAL PROVISIONS
US FEDERAL GOVERNMENT	Office of Surface Mining Control and Reclamation Enforcement	Surface Mining Control and Reclamation Act Title 30, Part 715	Code of Federal Regulations, Title 30, Part 715	Minimize disturbance to hydrological regime of both quality & quantity on & off site	Restore appropriate contour with high quality & depressions along alluvial terrace, complement of natural terrace of surrounding terrain	Diverse selective permanent seasonal variability equal to natural vegetation, exceptions dictated by post-mining land use	Capable of supporting permanent use or better land use	Protect society & environment from adverse aesthetic impacts, aesthetic disfigurement, timberland, wildlife & related environmental values
				HYDROLOGIC REGIME, RE-VEGETATION, FLOODING, DRAINAGE FEATURES, MINOR EROSION, AND LOGICAL BALANCE	GRADED TO GENTLY ROLLING SLOPES, RE-VEGETATION, FLOODING, DRAINAGE FEATURES, MINOR EROSION, AND LOGICAL BALANCE	ESTABLISH DIVERSE VEGETATION & LONG LASTING VEGETATION OF SAME SEASONAL CHARACTERISTICS AS NATIVE VEGETATION	RESTORE LAND TO SUPPORT LAND USE, POINTED PRIOR TO MINING, SAME LAND FOR LIVE WILDLIFE HABITAT, SECURITY	

TABLE 4.01: State and Federal Reclamation Standards and Industry Objectives. (continued)

Pre-existing Visual Quality References

This chapter concludes with an outline of scenic quality designations assigned by the Bureau of Land Management to the lands considered in this study. As part of resource management and planning activities the BLM assigned Scenic Quality Ratings, Visual Resource Inventory Classifications and Visual Resource Management Classifications to the regions studied. In most cases, original ratings and inventory data is incomplete or unavailable. Nevertheless, information regarding the pre-existing visual resource classifications is useful for general comparison to the results obtained in this study. The classifications reflect the values assigned by the regulatory authority (the BLM) to the scenic resources within the regions of the study.

The BLM Visual Resource Inventory and Management Classification system is briefly discussed in Chapter Three. To reiterate, visual resource management begins with Scenic Quality Ratings (like those used in this study). Class A ratings are assigned to scenery that combines the most outstanding characteristics of each landscape factor (scores ≥ 19), Class B is assigned to landscapes with some outstanding and some fairly common features (scores from 12 to 18), Class C scenery is common

to the physiographic province (scores ≤ 11). Inventory Class designations represent relative levels of scenic quality and are based on the Scenic Quality Ratings: Class IV indicates low scenic quality, Class III moderate scenic values, Class I and II represent the highest scenic quality. From these classifications management classes are derived: Class I objective is to preserve the existing character of the landscape, Class II objective is to retain visual character, Class III suggest partial retention of visual values and Class IV suggests land uses which require major modification of the environment. Class V classification suggests that the scenic resource should be rehabilitated.

Table 4.02 outlines the visual quality designations assigned by the BLM to the regions which encompass the study sites. The average scenic quality rating scores for each of the study sites evaluated are also included. Although the BLM rating scales and criteria have been modified somewhat to accommodate field conditions (see Chapter Three) a general comparison is nevertheless possible. The information presented in the table suggests that the results of this study are in keeping with pre-existing BLM scenic quality class designations. The classifications also imply that the scenic value of all of the land considered (Rehabilitated and Adjacent

	SITE ONE	SITE TWO	SITE THREE	SITE FOUR	SITE FIVE	SITE SIX
VISUAL RESOURCE MANAGEMENT CLASSIFICATION	Class IV	Unclassified, surrounding lands - Class III & IV	Class III & IV	Class III & IV	Class IV & V	Class III
VISUAL RESOURCE INVENTORY CLASSIFICATION	Unavailable	Unclassified	Unavailable	Unavailable	Unavailable	Unavailable
SCENIC QUALITY CLASSIFICATION	Unavailable	Unclassified	Unavailable	Class B (Score=12)	Unavailable	Class C (Scores=6 & 7)
AVERAGE ASSIGNED SCENIC QUALITY RATING SCORE	Score=7	Score=7	Score=5.5	Score=10	Score=8	Score=9
Rehabilitated land: Adjacent	Score=6	Score=9	Score=13	Score=11.5	Score=7.5	Score=13
undisturbed land:	Class C	Class C	Class C or B	Class C	Class C	Class C or B
Probable classification:						

TABLE 4.02: Visual Resource Quality Comparisons (Adapted from BLM Area Resource Management Plans).

Undisturbed Land, and the BLM resource areas) is marginal, or modest at best. In light of the consistently low scenic quality designations, however, one must acknowledge the possibility that the classifications are as much a function of methodology as visual character. This topic, then, will be taken up at the beginning of the next chapter, Conclusions and Recommendations.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The primary objective of this study is to assess the visual quality of rehabilitated surface coal mines in the western United States and identify issues that relate to this objective (Research Scope and Objectives, Chapter I). Administrative and regulatory policy, technology and innovation, and scenic resource assessment methods have been identified. This chapter addresses both these goals.

The findings and analysis presented in the preceding chapter are based on numerical values assigned to visual elements within the landscape. As such they are an abstraction of the aesthetic nature of the landscapes measured. They suggest, rather than define, the essential character of the scenic resource, but none-the-less offer valuable insight into the issues at hand. To augment conclusions drawn from the analysis provided in the last chapter, observations and recommendations concerning key issues are offered. They are presented in the spirit of inquiry, not as declarations of fact. Their purpose is to add depth to the analysis, encourage reflection, and broaden the readers' scope of understanding.

This chapter, then, begins with a discussion of the Bureau of Land Management Visual Resource Methodology. This process is briefly discussed in Chapter III, (the Limitations of the Study subsection) and at the end of Chapter IV. Observations elucidated by the Results and Analysis are also offered. Public interest issues are next identified. Since visual quality is, after all, a function of viewer perceptions, key areas of public interest are explored. An examination of the Surface Mining Control and Reclamation Act is contained in the third subsection. The consequences of the law, in terms of the scenic resource, are explored. Technological applications, associated with improved visual quality, are taken up next. Some of the conclusions related here, are based on the relationships analyzed in Chapter IV. This research concludes with observations regarding the value assigned to the visual resource by today's professionals, and implications for the profession of landscape architecture.

The Application BLM Visual Resource Management Methodology to Disturbed Landscapes

The BLM Visual Resource Management method is adapted for use in this study. Some limitations are inherent in

the method. Those that are particularly significant to this study are highlighted here. In this study, every effort was made to focus on permanent landscape factors and factors which the reclamation specialist has the power to manipulate, but this goal was not always achieved. As discussed in Chapter III, the ratings and criteria for the BLM landscape factors are not always appropriate. First among them is the presumption that flat landforms warrant ratings lower than steeper landforms. This is an especially confounding tendency when prairie or plains landscapes are evaluated. These landscapes, (which would include nearly the whole of the midwestern United States) almost always rate low in total score. In the western landscape, the lack of surface water is widespread. Yet the suggestion of water is startlingly apparent, more so than in lusher environments where contrast is less distinct (Figure 3.11). The methodology used in this study was modified in this regard. (See Chapter III, Adaptation of BLM Scenic Quality Inventory Process to Study Conditions.) And finally, the criteria for landscape scarcity are also somewhat misleading. As stated in Chapter III, scarcity cannot always be equated with visual quality.

More subtle, yet equally misleading is the inability of the method to capture ephemeral or transient

conditions. Light, time-of-day, weather, sky, and season exert a fleeting yet powerful influence on the visual character of the landscape. This weakness is shared by all visual assessment measures and a resolution to the problem is perhaps as fleeting as the conditions themselves. In this regard, the drought conditions that pervaded throughout the western United States during the study period influenced the results of this study. Speculative conclusions related to this factor suggest that scores for vegetation and color especially are not as high as would normally be the case. In a similar vein, extensive forest fires engulfed western Wyoming during the summer of 1988, graying and flattening the skies hundreds of miles away. This too, affects visual quality, but cannot be measured with conventional means.

When we further ponder the influence of transient qualities, it brings us to the realization that this characteristic extends far beyond days and seasons, into decades and millennia. Then the limitation of assessment methodology is no longer debatable. None of the findings, analysis, or conclusions presented in this study can harken to conditions in the future. Although effort was made to include samples of mature rehabilitation, no parcel was older than 15 years.

In addition to the issues outlined above, the use of the BLM methodology for the purposes of this study leads to two significant conclusions: 1) the methodology characterizes regional scenic resources more effectively than site specific visual quality, and 2) the methodology measures landscape components more effectively than aesthetic context - (relation of the landscape to the surrounding environment). The analysis in Chapter III ended with speculation about the uniformly low scores achieved for both land types, for all six study areas. When the scores are reviewed in terms of BLM visual resource classifications (see Table 4.02), none of the landscapes possess scenic values of any merit. This review supports the first conclusion offered above. The second conclusion offered is no less important, but more difficult to define. The methodology allows two landscapes with dissimilar visual character to be rated similarly, resulting in scores that belie the nature of the interaction between them. In fact, the methodology does not incorporate the means to address the issue of aesthetic or environmental context. Based on the observations made above, a visual resource evaluation system that combines the principals of site analysis with a contrast rating system would most likely provide a more accurate measure of visual quality. (For further

discussion the reader is referred to works by Lynch, 1962, and the BLM Contrast Rating System, 1986.)

Public Interest Issues

Some of the analysis and opinions shared in this study are based on prior research. Other observations simply reflect the way one person (the author) sees the landscape. This section offers a synopsis of issues related to public interest or social values. Not in terms of health and safety, but rather, in regard to cultural values in general. Not that health and welfare issues are not important considerations in mined-land reclamation--they are simply beyond the scope of this study. To begin with, the premise for consideration of public values is set forth in federal legislation (see Chapter II, Legislation subsection).

Viewer perceptions are an integral part of scenic values. In this study, measures of scenic quality are based on ratings of factors within the landscape. Scenic quality also depends, in part, on visibility. Rating the landscape in terms of visibility or distance zones is beyond the scope of this study. However, the visibility of the sites included is generally low. In most cases,

location mitigates the scenic impacts associated with reclamation. As described earlier, rehabilitated lands and the environments which surround them are open, isolated rangelands. The primary observers of the landscape, therefore, are cattle, antelope, lizards and rabbits - not humans. Sensitivity to the visual impacts of landscape disturbance is correspondingly low. In addition to location, viewer sensitivity is also a function of culture, particularly socio-economic factors. The people that live and work within viewing distance of surface coal mining operations often depend on the coal mining industry for their livelihood and well-being. If they are not in some way involved in the coal mining industry, they are often involved in ranching. These groups place economic well-being ahead of concern for scenic values. For the most part, mining and reclamation is seen as "progress", provided that health and safety are not jeopardized. In addition, this population is also aware of the relationship between reclamation costs and energy costs. They are likely to regard increased reclamation costs as a burden, one they are not eager to bear.

The Surface Mining Control and Reclamation Act

The original intent of the Surface Mining Control and Reclamation Act has already been discussed (see Chapter II, Legislation). There is no provision that requires rehabilitated land to look like undisturbed land. The law emphasizes the post-mining use of the rehabilitated resource(s). The Act avoids specific reference to visual quality. Yet, in combination with the inherent qualities of the landscape and technology, SMCRA is the single most important determinant of the visual quality of the rehabilitated landscape. Several provisions within the law make this so. First, the focus on post mining land-use. In the western United States this inevitably translates to grassland (forage) vegetation, of density and production suitable for livestock. While SMCRA also requires native diversity and minimal coverage, the appearance of the landscape is, for the time being, uniformly grassy (Figures 3.07, 3.12, 3.13). The quality of the landscape in terms of its post-mining land use is always the determinant of success, regardless of whether or not the resultant appearance of the land is at odds with scenic quality.

Equally important is the historical foundation for the standards set forth. SMCRA was enacted in response to

environmental problems and health and welfare issues associated with mining in the eastern United States. In addition, the sins of the past were the template for the provisions included. At the time of enactment, surface coal mining in the western United States was a young industry. This foundation has many repercussions in terms of visual quality. For example: Acid-mine drainage is a problem frequently associated with mining in the eastern United States. As such, SMCRA contains specific standards intended to protect the hydrologic resource. In the western United States, however, the nature of soils and overburden, precipitation and temperature, and topography and vegetation, are significantly different from the eastern United States. Yet decisions regarding drainage, sedimentation, and erosion control are essentially based on environmental processes encountered in the eastern United States. Even though SMCRA gives legislative primacy to the states, current regulations are still somewhat unresponsive to regional variation. The resultant uniformity is reflected in the results of this study.

SMCRA also places great emphasis on the return of the landscape to approximate original contour (A.O.C.). While this is reasonable in theory, it is not necessarily optimal for visual resources. The materials available for

sculpting the rehabilitated landform are a function of geological factors (depth of overburden, depth of coal seam etc.) - amounts do not always correspond to the premining landform configuration. Even if rehabilitation specialists were disposed toward the aesthetic design of the landscape, their artistic license is hampered by current regulatory requirements. This is especially true in relation to the provisions requiring the elimination of highwalls, depressions and nonconformities.

Approval to vary from the standards set in SMCRA must be obtained through the permitting procedure. Experimental variances, if proved unsuccessful, can be extremely costly to the operator. Even if their outcome is successful, costs incurred in terms of administrative requirements and delays are usually not justifiable. This is unfortunate, because variances to highwall reduction requirements, allows operators to mitigate the lack of topographical diversity reported in Charter IV. In most cases experimental variances that improve topographical diversity are approved on the basis of habitat enrichment. In no case is improved visual quality satisfactory criteria for an experimental practice variance.

Technological Aspects

Mined-land reclamation is a unique technological challenge. In no other land-use is the level of disturbance so severe. Reclamation transforms a formidable hole in the ground to a completely functioning ecologic community, (sometimes in a matter of months). Visual quality can be enhanced by the application of currently available technological means. In fact, innovative reclamation methods are being applied with rich scenic rewards (Figures 3.08 and 3.10). As indicated in Chapter IV, the major difference between Rehabilitated and Adjacent Undisturbed Land is related in part to topographical diversity. Fortunately, remedies exist to correct these deficiencies and thereby enrich the visual quality of the landscape - methods that involve direct manipulation of the topography. Undisturbed lands are unpredictably scraped, striated, crinkled, crusted, cut and strewn with earthy debris. A spontaneous and disorderly harmony results, even in so call "flat" landscapes. Reclamation equipment, bulldozers, tractors, scrapers, and seeding equipment create uniform, undulating, agricultural-like landform configurations. Dragline reclamation, when practical, can subtly modify this quality. Intrusions into the uniformity, in the form

of highwalls, undisturbed "islands" within reclaimed land, rock habitats (scattered or strewn [see Figure 3.07] rather than piled to pyramidal proportions) add a quick, haphazard dimension to the landscape. Less concern for occasional erosion and subsidence around drainages and sedimentation ponds (which is inherent to the landscape anyway), and more recognition of the visual complexity it creates should be considered. Reclamation laws mandate matching rehabilitated drainages to natural patterns and while this may be achieved in hydrologic terms, in aesthetic terms this particular goal had not been achieved. Some compromise between needs for erosion and sedimentation control (usually satisfied by drainages with capacity and uniformity much greater than natural patterns) should be explored -- in terms of both density and configuration. In addition, while we must acknowledge the primacy of post-mining land use (and the corresponding emphasis on grassland vegetation) greater consideration of wildlife habitat value (and the incorporation of more tree and shrub species) would likely produce noticeable differences in the appearance of the landscape. Most reclamation specialists maintained that greater differentiation, sorting, and shrub and tree invasion are inevitable consequences of time. (The point is argued in the broader sense as well -- in terms of

geologic equilibrium.) But if we choose to suspend our expectations with regard to scenic values (at least for the amount of time it takes nature to refine the rehabilitated landscape) some of the suggestions offered here make immediate economic sense, in addition to benefits to wildlife as mentioned earlier.

Final Observations

It seems that formal consideration of the visual resource is, in a sense, minimized within the sphere of mined-land reclamation. When in fact, to achieve the goals set forth in NEPA and FLPMA, equal footing with other environmental resource systems is a necessity. This research suggests that, the notion that visual resources are automatically protected when sound rehabilitation of the other environmental factors is accomplished, is misguided. As stated earlier, the landscape we perceive is more than the sum of its parts. As long as industry, administrators and reclamation laws treat visual resources as a by-product of other environmental issues, it is not likely that rehabilitation of the visual resource will reach its full potential. Likewise, the academic record is filled with literature addressing visual resource

management, mining, and reclamation, but what is needed, if we are to improve visual quality, is research that integrates these areas.

The practitioners of mined-land reclamation in the western United States are often hydrologists, agronomists, engineers, or range management specialists. Landscape architects or professionals with training or experience in environmental design or aesthetics are not among the majority. Within the regulatory and administrative sphere, landscape architects fare slightly better, but in general are similarly represented. (They are usually associated with recreation -- not mining and reclamation.) Given the nature of reclamation law and the environmental standards set forth, one can understand why this is so. What is overlooked, however, is the wholistic nature of the contribution that the profession of landscape architecture offers. Landscape architects are trained to evaluate the landscape and its components as a system, in terms of both aesthetic and environmental quality. This is not to say that they are more adept at perceiving landscape values than any other professional (or person, for that matter). They are, however, trained to combine knowledge of the resource system with aesthetic principals, and translate this combined knowledge into design solutions that optimize both. In addition, their

philosophical dedication to the land and stewardship ethic are unique among the professions. For these reasons then, it is suggested that landscape architects strive toward greater recognition of their talents and the potential application of their unique skills to the field of mined-land reclamation.

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APPENDIX A
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APPENDIX B
Scenic Inventory Evaluations

SCENIC QUALITY FIELD INVENTORY

Date: 7 JUL 88	Study Site: ONE	<input checked="" type="checkbox"/> Rehabilitated
Time: 6-8 AM	ST 01 R	<input type="checkbox"/> Adjacent Undist.
Rating Units:		Location: N17

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	BUILD - SOLID HORIZ.	LOW ROUNDED	LINEAL
	EDGIAL IN ENTIRETY	SPRINGY WIREY	CLUMPS
	DOTTED W/ IRREG.	DETAILED BY	VERTICAL
	CLUSTER	BUSH FORMS	POINTS
Line	STRONG, STRAIGHT	INDISTINCT	EDGE
	HORIZONTAL LAND TO	UNIFORM DENSITY	CREATES
	SKY LINE, LOW MESA	COVERAGE, LINES	ONLY
	STEP:	IN BACKGROUND ONLY	LINE
Color	VEGETATION LINES	DENSE MEDI-	INDISTINCT
	EDGE/GRASS COLOR	4M GREEN, LACES	OR NEXT
	PALE SKY / TAWNY	STRAW COLORS	BL. SOME
	EARTH CONTRAST	BUFFS - SOME LIME	WHITE
Texture	LANDFORM TEX -	UNIFORM NO	VARIED
	TUNE - SOLID WHOLE	PATTERNS THICK	BUT GENEAL
	EVEN A UNIFORM	SOME BUSHY	ALLY 17510.
	TEXTURE = COVERING	FUTTY	DIFFICULT

NARRATIVE

Rehabilitated area on north west perime-
 ter of site, directly adjacent to undisturbed
 land. Used for vegetation research and
 water quality monitoring. Flat topo-
 graphy and vegetation makes area virtually
 indistinguishable from surrounding land.
 Relatively recent revegetation lush and
 dense usual bare soil not yet apparent
 wild life: rabbits, birds

SCORE		
	Explanation or Rational	Rating
Landform	FLAT WITH HINT OF SLOPE / DRAINAGE, ROCK CLUMPS - LOW AND REVEGETATED	1
Vegetation	4 TO 6 MATURE TYPES, UNUSUALLY THICK SOME INCREASE IN COLOR DENSITY IN LOW PL	3+
Water	NO WATER, PATHS OF WATER, OR WATER SOUND PLANTS	0
Color	UNIFORM MEDIUM GREEN, LACES SOIL COLORS OR DRY VEGETATION, PALE SKY	2
Adjacent Scenery	QUIET SUBTLE, HORIZONTAL MESA MT BELGRAD, RANGELANDS POWER PLANT	1
Scarcity	LOW, RIPPLED LANDFORM TYPICAL MESA ETATION UNIQUE, UNIFORM, NO BARE SOIL	1+
Cultural	ROCK PILES, FENCE AND VARIETY	
Modification	W/O PLANTING AND SERVICES INSIGNIFICANT	1

TOTAL = 10

SCENIC QUALITY FIELD INVENTORY

Date: <u>2 JUL 88</u>	Study Site: <u>01C</u>	<input checked="" type="checkbox"/> Rehabilitated <input type="checkbox"/> Adjacent Undist.
Time: <u>MID MORN</u>	Rating Unit: <u>ST 02 R</u>	Location: <u>77</u>

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	<u>SIMPLE MOUNDED</u>	<u>VARIED GRASSY</u>	<u>ROCK</u>
	<u>FORM GENTLE ROUNDED</u>	<u>LAYER</u>	<u>PILE</u>
		<u>EVEN HORIZONTAL</u>	<u>CLUMP</u>
Line	<u>SLOPING CURVED</u>	<u>SOME INDICA</u>	<u>DOES NOT</u>
	<u>HORIZONTAL LINE</u>	<u>TION OF DRILL</u>	<u>CREATE</u>
	<u>WHEEL SLOPE</u>	<u>ROWS LINEAR</u>	<u>LINE</u>
Color	<u>MEETS SKY</u>	<u>BUT IRRREGULAR</u>	
	<u>UNIFORM DUSTY</u>	<u>STRAW COLORED</u>	<u>EARTH</u>
	<u>STRAW COLORED</u>	<u>SOME SOIL, LACK</u>	<u>TONES</u>
Texture	<u>(SEE VEGETATION)</u>	<u>GREENS</u>	
	<u>BOLD SIMPLE</u>	<u>FINE GRAIN</u>	<u>COARSE</u>
	<u>CONSISTENT FORM</u>	<u>UNIFORM DENSITY</u>	<u>IN</u>
	<u>LANDFORM DOES NOT</u>	<u>REGULAR, EVEN</u>	<u>CONTEXT</u>
	<u>CREATE TEXTURE</u>	<u>& SOMEWHAT COOERD</u>	

NARRATIVE

REHABILITATED AREA IN 7th GROWING SEASON. HIGH SLOPING AREA WITH NORTH WEST ASPECT, LOCATED IN SOUTH CENTRAL PART OF PERMIT AREA. SPOIL PILES & NEW-ER RECLAMATION NEARBY. MULLHED DUE TO SLOPE. (ACCUMULATIONS OF DEAD PLANT MATERIAL - GRAZING BEING CONSIDERED). MINING OPERATIONS - EQUIPMENT/ROADS VERY CONSPICUOUS.

SCORE		
	Explanation or Rational	Rating
Landform	<u>LONG GENTLE SLOPE, ONE LONG</u>	
	<u>ROCK PILE</u>	<u>1</u>
Vegetation	<u>UNIFORM GRASSY APPEARANCE</u>	
	<u>OCASIONAL LOW SHRUBS PALE SOIL</u>	<u>2</u>
Water	<u>NO WATER, NO PROVISIONS</u>	
	<u>FOR WATER</u>	<u>0</u>
Color	<u>MUTED TONES PALE BEIGES</u>	
	<u>TRANS. BUFFS NO GREENS NO CONTRAST</u>	<u>1</u>
Adjacent	<u>DISTANT BACKGROUND TOPOGRAPHY</u>	
Scenery	<u>DOMINATED BY MINING OPERATIONS</u>	<u>0</u>
Scarcity	<u>VERY COMMON IN SETTING NOT</u>	
Cultural	<u>REALLY INTERESTING</u>	<u>1</u>
Modification	<u>TEMPORARY MODIFICATIONS IN BACKGROUND</u>	
	<u>ROCK PILE, DRILLER'S IMPROVISED</u>	<u>0</u>

TOTAL = 5

SCENIC QUALITY FIELD INVENTORY

Date: 6 JUL 88	Study Site: Oac	Rehabilitated
Time: Late AM	Rating Unit: SJOGR	Adjacent Undist.
		Location: N17

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	LOW ROLLING GRASS	SMOOTH, UNI-	ROCKPILES
	SIMPLE FORM, ROCK	FORM HORIZONTAL	IRREGULAR
Line	PILES ADD COMPLEXITY	AL COVERING	CLUMPS
	SHADE CONCEAL HILL	CONTINUOUS LAYER	
Color	UNIFORM FLAT OR	NO DISCRETEABLE	NO LINES
	SLIGHTLY DIPPING	LINE CREATED BY	CREATED
Texture	HORIZONTAL LINE	VEGETATION VERY	RATHER
		SUBTLE STRATING	POINTS
Color	LANDFORM / VEGETATION	ISOLATED GRAY	SIMILAR
	CREATE ONE LIGHT	GREEN, UNIFORM	TO
Texture	GRAY BROWN	NEUTRAL PALE	SURROUND-
		GRAY BROWN	ING
Texture	COMPLETELY UNIFIED	MEDIUM FINE-FINE	VERY
	WALL ROCK PILE	DENSE CONTINUOUS	SHAPE
Texture	PTS RELATE MORE	COVER	POINTS
	TO VEGETATION		

NARRATIVE

REVEGETATED 1983, EVALUATED
DURING 5th GROWING SEASON. RATING
UNIT BORDERS SOUTHERN BOUNDARY OF
SITE 9 PARTS ARE VISIBLE TO PASSING
MOTORISTS. HWY 9 SANDUAN RIVER VALLEY
DOWN HWY FROM SOUTHERN EDGE OF PARCEL
ROCKPILES CREATE SUCCESSFUL WILDLIFE
HABITAT.

SCORE		
	Explanation or Rational	Rating
Landform	EVALUATED LOW SLOPING HORIZONTAL	1
	NO DRAINAGE VISIBLE, UNIFORM	
Vegetation	VERY DRY GRASSES, LOW SHRUBS	2
	SOME SPACING ARE SOIL	
Water	ABSOLUTELY NONE	0
Color	SILVERY GRAY BLAND, PALE	1
	SKY, BLUE GRAY EDGE IN DISTANCE	
Adjacent	VEWS TO RIVER TERRACE RICH GREEN	14
Scenery	WITH BLUES BEYOND INVITING	
Scarcity	COMMON IN REGION NOT VERY	1
Cultural	INTERESTING	
Modification	ADDITION OF ROCKS SOMEWHAT DIS	-
	CORDANT, UNNATURAL LOOKING	

TOTAL = 6

SCENIC QUALITY FIELD INVENTORY

Date: 6 JUL 88	Study Site: OAC	Rehabilitated
Time: 7 AM	Rating Unit: SJAU	X Adjacent Undist.
		Location: N7

LANDSCAPE CHARACTER		
Landform	Vegetation	Structure
GENERICALLY HORIZON	LOW AND ROUND	VERTICAL
TRAIL BROKEN BY DRAIN	ED. JAGGED & IRR.	LINEAR
AGE, WHICH CREATES	EGULAR, UNIFORM	ELEMENTS
SOME, COMPLEXITY/IRREGULAR	SPOT IN DISTANCE	
LOW, DISTINCT HORIZON	IRREGULAR	BOLD
TRAIL LINE, LAYERED &	STRAIGHT LINES	VERTICAL
STEP LIKE PATTERNS	ACCENTS DRAINAGE	REGULAR
CREATED BY DRAINAGE	DIFFUSE TO NONEVIST	REPETITIVE
MOTTLED BUEFS	OLIVE GRAYS	BROWNS
BEIGES, LIGHT NEUTRAL	ISOLATED BRIGHTS	NEUTRALS
CHARLES DULL SOIL	SOIL COLOR DOTTED	INSIGNIFI.
VEGETATION ROCK	ATES FLAT, BLAND	CANT
MEDIUM/DENSE	MEDIUM TEX.	SPORADIC
UNEVEN & RANDOM	TURE MEDIUM TO	UNEXPECTED
UNDER ROCK EXPOSED	SPARSE DENSITY	UNNATURAL
WEATHERED CLUMPY SOIL	RANDOM IRREGULAR	

NARRATIVE

Study parcel is a utility company
leasehold area. South and west of
permit area - approx. 80 acres in size.
Closely represents "undisturbed" conditions.
Has not been grazed for some time.
Includes variety of micro environments.
Power lines dramatically apparent. Wildlife:
crows, ants, grass hoppers, lizards

SCORE		
	Explanation or Rationale	Rating
Landform	LOW PROFILE WEATHERED SANDSTONE/SHALE OUTCROP, MESA/MT. BACKDROP, DRAINAGE DESERT SLEIGH VARIETY 2 1/4 MILES	2+
Vegetation	TYPES, ADKLE TO KADE HIGH, COLORED CONTRAST NO WATER, LITTLE INDICATION OF	3+
Water	WATER, SOME REG. CLUSTERS	0
Color	VARIETY IN VEGETATION AND CONTRAST	
Adjacent	W/ SOIL, SHADOWS OF SHALES AND SKY	1
Scenery	POWER LINES DISTRACT, MTS. IMESAS ADD INTEREST, RDS. RESIDENCES, SHIPERS	2
Scarcity	TYPICAL FOR REGION, TRILBY	
Cultural	INTERESTING FOR TOPOLING, VARIETY	1
Modification	POWER LINES DISTRACTING IN FORE GROUND, ALL GOOD ELEMENTS LESS NOTICEABLE	-2

TOTAL = 6

SCENIC QUALITY FIELD INVENTORY

Date: 6 JUL 88	Study Site: OAC	Rehabilitated
Time: 8 PM	Rating Unit: SJORAY	Adjacent Undist.
		Location: N17

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	FLAT BASIN-LIKE	LOW TO FLAT	POWER
	BROAD DISTANT FORMS	FORMS - SOME	POLES
Line	CONTAIN SPACE, FOLD	ROUNDED MOST	LINE
	SIMPLE SPACE	SMALL SPOTS	LINEAL, VERTICAL
Color	OVERWHELMINGLY	DENSE STRAIGHT	VERTICAL
	HORIZONTAL SKY/LEAD	HORIZON DOMINANT	CURVED
Texture	SOME BREAKS IN DISTANCE	MURGE AREAS	HORIZONTAL
	CUT IN DISTANT		
Color	PAINTED PALE	MOTTLED GRAY/THIN	DARK
	YELLOW, LOW SUN ANGLE	SOIL COLOR DOMINANT	AGAINST
Texture	INEFFECTIVE LOW CON.	FAINT GREENISH	TAWNY
	TRANSITABLE SKY	SHADINGS VERY LIMITED	LANDSCAPE
Texture	COBBLES & VEGETATION	FINE TO MED GRAIN	REGULAR
	SMOOTH TEXTURE, LAND	UNIFORMLY SPARSE	EVEN
Texture	FLAT UNIFORMLY FLAT	SPECIFIC - IRREGU.	SEQUENCE
	NOBBLE RUFFLES, HORIZONTAL	LAR SHADINGS (COLOR)	

NARRATIVE

Graded Land East of Southern part of
 permit area. Rating Unit is a broad
 expansive basin. ADJACENT TO MINING OPERA-
 TIONS. GRADUAL INCREASE IN ELEVATION AT
 EDGES OFFERS VIEWS OF OPERATIONS. EDGES
 ALSO EXHIBIT DIVERSITY NOT APPRECIABLE FROM
 DISTANCE (BLUFFS, MESAS, MOUNTAINS, NOBBLE) INTEREST.
 THE TOPOGRAPHY OR PERIMETER. BASIN DROPS TO
 RIVER TERRACE AS WELL.

SCORE		
	Explanation or Rational	Rating
Landform	FLAT-LIKE BASIN LIMITED BY BUTTES/MESA	
	EXPANSIVE OPEN PLAIN MINE IN DISTANCE	1
Vegetation	LITTLE OR NO DIFFERENTIATION SPACE	
	SOIL COBBLES PROVIDE LIMITED VARIETY	1
Water	NO WATER	
		0
Color	QUIET DRY YELLOW DULL NO SHAD-	
	OWING SKY FLAT DARKENS AT HORIZON	1
Adjacent	LARGE SHALLOW DEPRESSION EMERGED BY	
	MTE. BUTTES OUTCROPS. DISTANT SOIL RIDGES	5
Scenery	VERY COMMON IN REGION. INTEREST IS	
	AT EDGES THAT FRAME SPACE	1
Scarcity	POWER LINES CROSS CREEKS EVERPRESENT	
	FEW ADJ. H2O FLACS. NO DESERT	-1

TOTAL = 6

SCENIC QUALITY FIELD INVENTORY

Date: JUL 88	Study Site: DAC	Rehabilitated
Time: Dusk	Rating Unit: 5703 AU	Adjacent Unrest.
		Location: NW

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	FLAT HORIZONTAL	LOW ROUNDED	POWER
	FORM SOLID UNI-	FORMS FEATHER	LINE
	FIELD	EAR LIKE CREEP.	TRANS
		ING MASSES	METERS
Line	HORIZONTAL HORI-	INDISTINCT	CORES
	200 LAYERS IN	NONEXISTENT	WORK
	DISTANCE		POINTS
Color	BUFFS TANS	TEAL GRAYS	NEUTRALS
	GRAY BUEVES IN	BRIGHT GREENS	GRAYS
	DISTANCE	BUEVES	
Texture	CONTRAST FORE	MEDIUM FINE LINE	FREATIC
	GROUND A MIDDLE	GLAIN MEDIUM	IRREGULAR
	GROUND IN BACK	IRREGULAR DEN	CARP
	GROUND	SITY	CLEAR

NARRATIVE

Parcel is directly adjacent to Pinton Reclaim (See 5701 R) separated by fence. USED FOR WINTER GRADING, SLIGHTLY HIGHER ELEVATION BUT SAME FLAT LAND FORM. AREA CONTAINS POWER LINES & IS ALSO ADJACENT TO POWER PLANT. INTERMITTANT LIGHT RAIN AND CLOUD COVER INTERRUPTED RATING.

SCORE		
	Explanation or Rational	Rating
Landform	FERTILIZING PLAINS DIPPING SW	
	ROCK CRUSTY OUTCROPS	1
Vegetation	DIVERSITY OF SPECIES. COLORS	
	AND FORMS SIMPLE BUT DISTINCTIVE	4
Water	NO WATER. PROSODIAL PATTERNS	
	IN SWICK ROCK	0
Color	GRAYS GREENS TEALS BUEVES	
	SANDS. WEATHER CREATES DEEPER RAINBOW	1+
Adjacent	MIXED DRG. FAVORABLE TO UNOBTAIN	
	GIVE TO DISTRACTIVE	0
Scarcity	VERY COMMON IN SETTING	
		1
Cultural	POWER LINES FEEDLES EVER.	
	PRESENT DISTINCTION	-1

TOTAL = 6+

SCENIC QUALITY FIELD INVENTORY

Date: <u>2/26/84</u>	Study Site: <u>Two</u>	<input checked="" type="checkbox"/> Rehabilitated
Time: <u>10:11 AM</u>	Rating Unit: <u>RT 01 R</u>	<input type="checkbox"/> Adjacent Undist.
		Location: <u>MM</u>

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	<u>Simple smooth</u>	<u>low, uniform</u>	<u>None real</u>
	<u>continuous</u>	<u>occasionally</u>	<u>shaded</u>
Line	<u>uninterrupted gradual</u>	<u>vegetation is</u>	<u>flat.</u>
	<u>continuous horizon line</u>	<u>relatively uni-</u>	
Color	<u>layered furrows</u>	<u>form only give</u>	
	<u>along around hill</u>	<u>where the joins</u>	
Texture	<u>uniform flat</u>	<u>monotone, flat</u>	
	<u>greenish yellow bay</u>	<u>green, flat top</u>	
	<u>like palm vegetation</u>	<u>dry vegetation</u>	
	<u>thin sandy soil</u>	<u>of</u>	
	<u>the landscape is</u>	<u>medium line-line</u>	
	<u>uniform - vegetation</u>	<u>regularly spaced</u>	
	<u>exposed texture</u>	<u>of</u>	

NARRATIVE

Located in south west part of permit area. 2nd growing season, 1st w/o irrigation. Appx 75 acres. Topo. Graphy creates open, visible, exposed space. Vegetation is uniform. Good views to surrounding area. No water, quiet. Hill is ringed by furrows.

SCORE		
	Explanation or Rational	Rating
Landform	<u>large high rounded hill, gradual (4 dips) 40 slope (some steep areas)</u>	<u>1</u>
Vegetation	<u>Uniform height textures, thimble weed, short spaced, rice grass, dry</u>	<u>2</u>
Water	<u>None</u>	<u>0</u>
Color	<u>uniform pale flat green, light / 1771</u>	<u>1</u>
Adjacent	<u>like same cotton, straw, palm, bamboo</u>	<u>1</u>
Scenery	<u>Enhanced by flatlands, bad lands, huge flat out ridge, distant Mts, road</u>	<u>3</u>
Scarcity	<u>typical but pronounced interesting, unusual lack of minimal patterns</u>	<u>0</u>
Cultural	<u>no cultural features, no signs around</u>	<u>0</u>
Modification	<u>land form conditions</u>	<u>-1</u>

TOTAL = 6

SCENIC QUALITY FIELD INVENTORY

Date: <u>Jul 17/88</u>	Study Site: <u>Two</u>	<input checked="" type="checkbox"/> Rehabilitated
Time: <u>Late Morn</u>	Rating Unit: <u>NO 02 R</u>	<input type="checkbox"/> Adjacent Undist.
	Location: <u>NUT</u>	

LANDSCAPE CHARACTER

	Landform	Vegetation	Structure
Form	<u>Flat Bold Strm.</u>	<u>Flat rounded</u>	<u>SOME FENCES</u>
	<u>Scrub patches</u>	<u>Regular</u>	<u>LINE - FORMS</u>
	<u>Paths for erosion</u>	<u>Tangle of vegeta</u>	<u>GENERALLY</u>
Line	<u>High line dem.</u>	<u>flat</u>	<u>INSIGNIFICANT</u>
	<u>Edges sharp</u>	<u>Vegetation uni-</u>	
	<u>Edge flat</u>	<u>form - varied</u>	
Color	<u>Straight</u>	<u>Curled by to-</u>	
	<u>Shaded green</u>	<u>Re-shaped</u>	
	<u>Green and brown</u>	<u>Mid-green</u>	
Texture	<u>Color</u>	<u>and green</u>	
	<u>Created by</u>	<u>attained</u>	
	<u>vegetations</u>	<u>Medium fine</u>	
		<u>Spars. diversity</u>	
		<u>in spacing -</u>	
		<u>dense</u>	

NARRATIVE

Directly adjacent to undisturbed/graded area
North East side of permit area. Could not
easily distinguish between rehabilitated
and undisturbed land due - erosion control
techniques and varying soil colors indicated
rehabilitation. Area occasionally graded
with out mining company permission. Graded
Cratogeomys pictif. Distant Dwellings
capture attention.

SCORE

	Explanation or Rationale	Rating
Landform	<u>EXPANSIVE HILL W. VIEWS TO</u> <u>GREEN PLAINS SHALLOW CONTOUR DICES</u> <u>DRY GRASSES CALFTO LREE HIGH</u>	<u>1</u>
Vegetation	<u>SOMEWHAT HIGH, LITTLE CONTRAST</u>	<u>2</u>
Water	<u>ENTIRELY ABSENT NO EVIDENCE OF</u> <u>DULL GREEN LIFELESS NEUTRAL SOILS</u>	<u>0</u>
Color	<u>SOME GRASSES, POWDERY, VERY DRY</u>	<u>1</u>
Adjacent Scenery	<u>CRUMBLED DWELLINGS RDS FACES PLAINS</u> <u>MTS MOST UNOBTRUSIVE DWELLINGS IMPR</u> <u>COMMON IN SETTING - NO FEATURES</u>	<u>0</u>
Scarcity	<u>OF INTEREST</u>	<u>1</u>
Cultural	<u>EROSION CONTROL, LORE KNOWN</u>	
Modification	<u>CONDO, VARIATIONS IN SOIL COLOR</u>	<u>0</u>

TOTAL = 5

SCENIC QUALITY FIELD INVENTORY

Date: 13 Jan 88	Study Site: Two.	<input checked="" type="checkbox"/> Rehabilitated <input type="checkbox"/> Adjacent Undist.
Time: AM	Rating Unit: NJ 03 R	Location: NJ

LANDSCAPE CHARACTER		
	Landform	Vegetation
Form	Flat, Bold Simple	Generally low
	Some sea of some	occasional jagged
Line	irregular down-	irregular forms
	age	
Color	Horizontal along	diffuse, some
	demarcation - flat	irregularity of
Texture	of drainage - land	array but
	locus dips slightly	diffuse
	gray-yellow	yellow/golden
	creamy yellow	green/yel
	honey	grayish
	Smooth unified	MEQ/FINE in
	but some	distance, variation
	dense spots	dense thick some
		coarse, patchy

NARRATIVE

The SMCRA Rehab. - not topsoiled
rough graded only - located on perimeter of
central eastern portion of site. Lots of wild.
life coyote jackrabbit etc. Very Naturalistic
appearance. Diversity in vegetation (patterns)
surface rubble. Hot but pleasant land-
scape. Subtle qualities much finer
example of rehab. than other post
SMCRA of areas sampled.

SCORE		
	Explanation or Rational	Rating
Landform	Low and flat w/ gradual increase in elevation, w/ diverse diversity, changes nature, typical beauty of patterns	1+
Vegetation	refined land form, base to be a pleasure	4
Water	Big D - only sand and tamarisk	0
Color	coarse, yellows, full green, yellow	
Adjacent	of landscape base adjacent, buff, green	2
Scenery	huge rock and grass, bog back, dominant	2
Scarcity	this unlike other areas in region typical for rehab.	1
Cultural	basically no permanent cultural	
Modification	modified patterns, landscape analysis	0

TOTAL = 10+

SCENIC QUALITY FIELD INVENTORY

Date: <u>Jul 11/88</u>	Study Site: <u>Two</u>	Rehabilitated
Time: <u>late morning</u>	Rating Unit: <u>NSOAH</u>	Adjacent Undist.
		Location: <u>MT</u>

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	simple low flat	low carpet like	simple
	horizontal forms	layers some	broken
		flat shapes	flat
		mostly low	round
Line	horizontal - steady sky	bold horizon	line
	band created by	flaming in	broken
	large smooth boulders	array of trees	broken
	broken by jagged rocks	low shrubs	broken
Color	fluffy chalky	lime green	bright
	land of brown sand	earth colors	dark brown
	soil some dark	light and dry	moderate
	rock out crops	broken - contrast	pale red
Texture	Medium - fine	fine to medium	medium
	smooth - uniform	even surface	generally
	scattered - rough	uniform to uni-	uniform
		famly sparse	flat

NARRATIVE

Area adjacent to northeast border of permit area - south of wetland mitigation canal. Used for oilfield uses (cows), roads and power lines, overcast sky. Mining operations visible. Encompasses a sheltered spot at the edge of mesa. In general an appropriate mixture of man's activities. Red crops of natural forms - array of wash, rock out crops, horizon line. Grasshoppers - prairie dog burrows

	Explanation or Rational	Rating
Landform	low flatish horizontal land forms make a diagonal way through	1+
Vegetation	green grass, tall grass, shrubs, some white wood, tall grasses, low shrubs, some white wood, tall grasses, low shrubs, some white wood	3+
Water	low green, some white, some brown, some red with white, some brown	1
Color	low green, some white, some brown, some red with white, some brown	2
Adjacent	low green, some white, some brown, some red with white, some brown	2
Scenery	low green, some white, some brown, some red with white, some brown	1
Scarcity	low green, some white, some brown, some red with white, some brown	1+
Cultural	low green, some white, some brown, some red with white, some brown	1+
Modification	low green, some white, some brown, some red with white, some brown	0

TOTAL = 10+

SCENIC QUALITY FIELD INVENTORY

Date: Jul 12, 88	Study Site: T-2	Rehabilitated
Time: 8:9 AM	Rating Unit: NJ02 AH	Adjacent Undist.
		Location: 717.

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	Round complex irregular forms irregular border scattered	irregular sparsely in consequential	Vertical linear
Line	Simple sand path in road through land	irregular patches non-existent	Strait scattered slightly
Color	Black, white, grey Black, white, grey Black, white, grey Black, white, grey	Green and dark medium light green	Light White slightly slightly
Texture	Smooth - very smooth lined mixed fine coarse irregular	Medium grain very sparse irregular	Absent in stark setting

NARRATIVE

Area directly adjacent to mining activities just east of the central part of the permit area, contains roads, power lines, and pond to keep pit drained. Badland landscape has mysterious maze like quality. Abundance of unique land forms & lack of vegetation gives stark timeless character - Unique

SCORE		
	Explanation or Rational	Rating
Landform	Unusual landforms, old mining, black-rich and varied composition	4
Vegetation	little or none, sparse, sparse, barren, bare soil, unlikely to exist	1
Water	No water, only sand, tracks	0
Color	A dominant color, adjacent	3+
Adjacent	black, black, black, black, black, black	3+
Scenery	the ground continuing, adjacent, green, iron, black, black, black, black	2
Scarcity	the same landscape, colorful and	3
Cultural	various examples with the region	3
Modification	the power, color, very apparent, the	-1

TOTAL = 10+

SCENIC QUALITY FIELD INVENTORY

Date: 13 Jul 88	Study Site: Two	Rehabilitated
		Adjacent Undist.
Time: 7:30 pm	Rating Unit: N503 AU	Location: N7

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	Expansive, simple	Ground hugging	Vertical
	field array	flat - like uni-	horizontal
Line	board	form in water	chunky, jagged
	one distinct horizon	as low	of slight
Color	line subtle array -	distinctly uni-	about straight
	10' from clouds	form flat	stays
Texture	glaciated	varies up	irregularly
	low uniform	low, uni-	horizontal, flat
	late yellow	green to	medium
	green blue & red	green - top	dark or
		flat, blue	dark, brown
		yellow	dark, blue
	created by smooth	medium fine	varies
	uniform vegetation	uniform to	medium
	land - not by	rough and	land use
	land cover	spotty	horizontal, mixed

NARRATIVE

Flat mesa that surrounds the permit area to the east. Very large rating unit. Land use is varied. Man made cultural patterns give interesting shapes and forms to an otherwise flat (being) landscape.

SCORE		
	Explanation or Rational	Rating
Landform	Overall impression is flat edge of mesa, feathered edges	1
Vegetation	shaded, green, brown, blue, and green crops - mostly dense, scrubby	2
Water	Big ZIP	0
Color	color varies up landscape, brilliant	0
Adjacent	medium green to dark green	2
Scenery	mesa is highest point in landscape	0
Scarcity	very distant, 1958, San Juan River valley	0
Cultural	common landscape, land use	0
Modification	and patterns are key to interest	1
	abundant, not visually stimulating	0
	interesting, not necessarily beautiful	0

TOTAL = 6

SCENIC QUALITY FIELD INVENTORY

Date: 21 JUL 87	Study Site: Thrice	Rehabilitated
Time: 6:30 PM	Rating Unit: SPDR	Adjacent Undist.
		Location: WY

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	LONG LINEAR LANDFORM	CONTINUOUS	
	DEFINING BY LOW RIDGES	LAYER OF SWEEP	VARIED
Line	SLIGHT HORIZONTAL	ING UNIFORM	(SEE CULTURE)
	VARIETY ADDS COMPLEXITY	GRASS	ALMODIFICATIONS
Color	HORIZONTAL WITH	UNIFORM HULL	
	USING EDGES SOME	20 FTAL WITH	NOT DISTINCT
Texture	SEE SAW APPEARANCE	SLIGHT CREASED	
		APPEARANCE	
Color	VEGETATION LINES	UNIFORM STRAW	
	COLOS OUTLEST	COLOR GREEN	ARTIFICIAL
Texture	JERSEY ROCKY GROWS	FLAT UNDER COAT	
	THUMP TAN		
Texture	UNRAVLED RUFFLED	SMOOTH SWIRLING	
	JAGGED EDGES	SEA OF GRASS	VARIED
Texture	TERRACE STRAITED	FINE UNIFORM	
	WRINKLED	FENTHERY	

NARRATIVE

REHABILITATED LAND APPX. 70 ACRES
 PART OF LONG LINEAR CONTINUOUS
 HILL BETWEEN RIDGES OF UNDISTURBED
 LAND. SURROUNDED BY ALTERNATING
 REHABILITATED AND UNDISTURBED LAND.
 OFFERS VIEWS OF REHABILITATED
 LAND AS FAR AS THE EYE CAN SEE.
 VERY GRASSY WHEN LIKE OCEAN OF VEGE-
 TATION. OVERGROWN ILLEGIBLY TRAVELED TRACES.
 IMAGING OPERATIONS COMPLETE.

SCORE		
	Explanation or Rational	Rating
Landform	LOW ROLLING HILL, VALLEY SHAPE, GENTLY USING RIDGE ON EITHER SIDE, UNRAVLED GRASSY, LITTLE HIGH, PLAIN LIKE, DO TOP	1
Vegetation	LAYER REEF, GRASSY COVER, UNIFORM THICK DENSE, SHALLOW SCARPEN CLT PTHN	3
Water	SEDIMENTATION POOL (DRAIN)	0
Color	PALE YELLOW, PALE BLUE, SOME GREEN	
Adjacent	UNDERTONES, RIFE, THUMP, ORANGE	1
Scenery	UNRAVLED ROCK, FORM THIN LAYER AT HORIZONTAL, DARK RUFFLED OUTLINE	1
Scarcity	SOMEWHAT COMMON, BUT PRECISE APPEAR-	
Cultural	WALL AND CAUSTY LANDSCAPE UNIQUE	+
Modification	FEEL OR HORIZON DRILL, BROWS, GIGANTIC ROCK PIES OF BARE SEDIMENT POOL VUS	-

TOTAL = 5

SCENIC QUALITY FIELD INVENTORY

Date: 2/24/88	Study Site: Thicket	Rehabilitated
	SMO26	Adjacent Undist.
Time: 8:30 PM	Rating Unit:	Location: WY

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	LINEAR GENTLY "V"	LAYERED UNIFORM	10-15
	SHARPED STRIP SLOPES	CONSISTENT	CUMMIS
	PROGRESSIVELY TO RIDGE	COVERING GRASSES	ROOM SIZE
	FLANKS SIMPLE		
Line	HORIZONTAL CRISS	UNIFORM HORIZONTAL	POINTS
	CRISSES SLOPING	FOLLOWING LINE	NO LINEAR
	UP & AWAY FLAT	OF TOPOGRAPHY	PATTERN
	RESTFUL		
Color	TAWNY GOLDEN	UNIFORM BUFF	BUFF
	BROWN UNIFORM	PALE BEIGE SLIGHT	SAND
	(SEE VEGETATION)	PREPPING OF	
		GRASS	
Texture	SMOOTH BOLD	FINE GRAIN	COARSE
	CONTINUOUS	HIGH DENSITY	RANDOM
		UNIFORM THICK	IRREGULAR
			SPARSE

NARRATIVE

Again this parcel is a long narrow strip by narrow ridges. The whole area slopes upward (Dips) and is elevated somewhat affording views to adjacent areas. Parcel itself forms gentle "U" shaped valley dotted with gigantic rock piles. Uniform grassy vegetation. Remote and shadowed

SCORE		
	Explanation or Rational	Rating
Landform	SHALLOW VALLEY FORM NEARLY HORIZONTAL BUT GENTLY SLOPED	1
	VARIETY BUT NOT CONTRAST UNIFORM	
Vegetation	DEW GRASS COVERAGE SOME SEED ROWS	2
	NO WATER AND INDICATION OF	
Water	WATER	0
Color	YELLOW BUFF GOLDEN PALE MAHOGANY	
Adjacent	COLD GREY TURKY WARM LIGHT SOIL	1
Scenery	SAME AS RATING UNIT REMOTE, WERE SPOTTY HORIZON TITRUS GREEN DRAINAGE	0
Scarcity	THE KIND OF LANDSCAPE YOU DINE BY	
Cultural	NO NOTICING - COMMON	1
Modification	ROCK PILES SOME BIG & PLACED ON RIDGES NO VEGETATION TO SOFTEN	-1

TOTAL = 4

SCENIC QUALITY FIELD INVENTORY

Date: 23 JUL 88	Study Site: Thrice	<input checked="" type="checkbox"/> Rehabilitated
		<input type="checkbox"/> Adjacent Undist.
Time: 8-9 AM	Rating Unit: SM 03 K	Location: WY

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	NARROW SLOPING	ROUNDED SIMPLE	
	STAIR SMOOTH	FORMS WITH FLAT	None
	ASCENDING MORE	GROUND COVER &	
Line	JAGGED AT EDGES	SPINDLY GRASSES	
	REGULAR LONG	INDISTINCT	
	HORIZONTAL SLOPE	CURVING LINE BC.	
Color	Occasionally Jagged	THICK GRASSES &	
	ROCK FRINGES	SHRUBBED AREA	
	GREY BROWNS	BRIGHT FLAT YEL.	
Texture	Edges NEUTRALS	LOW GREENS, THICK	
		TAWNY DIRTY	
		BROWNS	
	CONSISTENT SOLID	MEDIUM GRAIN TO	
	EDGES INTERRUPT.	FINE SPARSE	
	ED AT EDGE W/	IN SPOTS UNEVEN	
	JAGGED OR RIDGELIKE	RANDOM SPACING	

NARRATIVE

Extremely narrow sloping strip similar in configuration to other rehabilitated parcels evaluated but smaller. Rises to ridge and descends. Quality of vegetation changes dramatically depending on aspect & exposure from waist high shrubs to bare patchy ground. Older rehab than others inventoried (76-77)

SCORE		
	Explanation or Rational	Rating
Landform	LONG NARROW STRIP BETWEEN TWO RIDGES RISES TO EAST. SOME FLAT AREAS	1
Vegetation	WELL ESTABLISHED SHRUBS, GRASS UNDER STORY, AMPLE SOIL NO ROWS	3
Water	NO WATER NO DRAINAGE	0
Color	YELLOW GREENS PALE TAWNY WHIT	
Adjacent	BLUE GRAY MEDIAN EITHER SIDE	1+
Scenery	ASPECT ELEVATION OFFERS VIEWS TO MOSAIC OF UNDISTURBED LAND & MTTS.	2
Scarcity	VERY COMMON REHAB WELL	
Cultural	EASILY MISSED	0
Modification	PATTERNS DRIES W/ PATCHES EMPTY	
	ROND, ACQUISABLE FROM DISTANCE	-1

TOTAL = 6+

SCENIC QUALITY FIELD INVENTORY

Date: 21 JUL 88	Study Site: Three	Rehabilitated
Time: 730 PM	Rating Unit: SMO 1 AU	Adjacent Undist.
		Location: WY

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	SLOPING SMOOTHLY	VARIETY IN FORMS	
	ROUNDED LINEAR HUMPS	CLUMPS FAN SHAPES	ONE LOWER
Line	FLAT AREAS FILL	DETAILED OPEN	POLE
	BETWEEN	MASSD LAYER OF GRASS	ALMOST
Color	HORIZONTAL TILTING	PATTLE IN DISTINCT	IMPERCEPTIBLE
	SLIGHTLY ROUNDED OR	RUGGED SCRAPPY	
Texture	CHARILINEAR GROOVES	COMPLEX	
	W/ RAGGED CLUMPS		
Color	DARK BROWN/GRAYS	SAGES COLDS RUSTS	
	MOTTLED IN DISTANCE	LIMES YELLOWS	
Texture	BUFFS W/ FLAT OLIVE	TUFTS WHITE	
	MUCH SANDY		
Texture	LUMPY LINEAR SCO.	MEDIUM GRAIN	
	LEAFY, FESTOONED W/	DENSE PATTERNING	
Texture	JAGGED CRUMBLY	UNIFORM COVERAGE	
	COARSE FRINGES	RANDOM MIX COARSE	

NARRATIVE

RATING AREA ADJACENT TO AND IN BETWEEN
REHABILITATED LAND (BEDS). LANDSCAPE IS A
SERIES OF LOW RIDGE LIKE FORMATIONS RUNNING
PARALLEL TO REHABILITATED STRIPS. LOTS OF
WILDLIFE ANTELOPE RABBIT, BIRDS, LIZARDS.
RESTLESS, JAGGED

SCORE		
	Explanation or Rational	Rating
Landform	FLATISH ROLLS / ROLLING COVER IN PLACES	
	W/ ROCKY CURVE RUGGLE CLUMPS DISCONTINUED	2
Vegetation	AT LEAST 3 MAJOR TYPES SPRAWLING CLIMBING &	
	CRAWLING THE ROCKS & GROUND, SCRUBBY TO FEATHERY	4
Water	2.1000	0
Color	SPECTACULAR VARIETY IN VEGETATION LIMES	
Adjacent	SAGES, LEMONS TO WINT SOFT PURPLE/BLK SEV	4
Scenery	REHAB. JUTTH POSED DISCONTINUOUS BUT	
	RESTFUL CONTRAST	2
Scarcity	INTERESTING BUT FAIRLY COMMON IN	
Cultural	REGION	1
Modification	STONE BUT ELECTRIC POLE	
	WHICH IS WEIRD BUT UNOBTUSIVE	0

TOTAL = 13

SCENIC QUALITY FIELD INVENTORY

Date: 23 JUL 88	Study Site: Three	Rehabilitated
Time: LATE AM	SMOZAU	<input checked="" type="checkbox"/> Adjacent Undist.
Rating Unit:		Location: WY

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	ROLD DISTINCT	LOW DENSE	OLD PATTEN
	SMOOTH BASIN FORM	CLUMPS OR	RD
Line	OCCASIONAL ROCKY	LAYERED COATING	FL LINES
	DIVERSITY	VARIES	
Color	SWEPT GENTLY	SWEETING SWATHS	
	CURVED HORIZONTAL	BRAGGING SUMMER-	(VIVID)
Texture	LAYERED LINES	ING DEFENSE	SHALLAR
		CULMINATE	HORIZONTAL
	TAWNY GRAY GREEN	GRAY GREEN	
	SILVER SKY AND	BLUE TAWNY	NEUTRAL
	BLUE GRAY MTS	MEDIUM BEIGES	
	(SEE DEC)	BRIGHT MEDIUM GREENS	
	MED TO FINE TEXTURE	MED TO FINE	
	DIFFUSE (SEE DEC)	GRNIN, IRREGULAR	SMOOTH
		DENSITY IRREGULAR	FINE (VIVID)
		ARRANGEMENT OF LARGE PATTERNS	

NARRATIVE

Area rated 13 south of adjacent to entry road. Encompasses a expansive basin that offers distant views of mt ranges which create basin. Contains drainage ways, ponds, and miles of swirling sage. Wild life abundant. Some rock out crops give surface texture. Wide open sky. HOGBACK RIDGES NOT AS NOTICABLE AS ELSEWHERE IN BASIN

SCORE		
	Explanation or Rational	Rating
Landform	BROAD BASIN EDGE, FLAT GENTLE DRAINAGE, ROCK RUGGLE HERE & THERE	1
Vegetation	CATTAILS EDWARDS WETLAND NEARS SAGE & MORE SAGE IN BROAD SWEEP	4
Water	SILL SHALLOW PONDOS CATTAILS WILDOUSE FLOWERING	2
Color	GREENS GRAY BLUE TEALS SWATHS BEIGES	
Adjacent	BASIN GREEN BASIN DRAINAGE, BLUE	2+
Scenery	FLY MOUNTAIN BACKGROUND MEDIUM	
Scarcity	LOW NATURAL FOREST	2+
Cultural	7000' "BIG VALLEY" LOOK NOTHING NEW - PERFECTLY APPROPRIATE	1
Modification	ROAD & FENCE LINES NOT BIG ENOUGH TO COMPETE WITH EXPANSE, POTHOLE!	0

TOTAL = 12+

SCENIC QUALITY FIELD INVENTORY

Date: 10 AUG 88	Study Site: FOUR	Rehabilitated
		Adjacent Undist.
Time: 9-10 AM	Rating Unit: SNOOK	Location: CO

LANDSCAPE CHARACTER		
	Landform	Vegetation
Form	BOLD SLOPING MASS	SINGULAR LAYER
	UNDULATING HUMP	FOLLOWS
	SURFACE, MOGULS	CONTOUR
	HUMPED	
	UNDULATING CURVING	FOLLOWS
Line	FLUID MOUND	CONTOUR OF
	ACTIVE HET	LAND
	TRANQUIL	
Color	LAND FORM COLOR	HAY GREEN
	BOLD BY VEGETATION	WITH SOME
	UNIFORM EASY	BUFFS YELLOW
	GREEN	BROWN
Texture	MED. COMPLEX	FINE GRAINED
	BUT UNIFORM TPO	THICK DENSITY
	FEATURE SMOOTH	EVEN COVERAGE
	BUT BARE SURFACE	

NARRATIVE

Fairly steep hillside slopes
to sediment pond. RATING UNIT
MOST UNIQUE FOR MOGUL hillside.
Humped Bumpy SURFACE CONFIGURA-
TION. SLOPE IS UNIFORMLY GREEN
W/ STRAW MIX. DIFFICULT TO IMAGINE
WITH TREES. MISSING THE BARE ROCK
OR SANDWAS. BUT INTERESTING SUR-
FACE TREATMENT OLD-PAL SMCMA

SCORE		
	Explanation or Rational	Rating
Landform	UNIQUE SHAPES PATTERNS ON STEEP HILL SCULPTED VERY STRIKING	3
Vegetation	NO CONTRAST UNIFORM FEATHERY FLUID GRASSY	1
Water	STILL POND, TAPERS AT FOOT OF SLOPE DATE REEDS. WAITING OVERPOND	3+
Color	DIVERSE CHAMA FLAUS, HAY GREEN SHADOWS PATTERNS FROM TPO REFLECTS.	2
Adjacent	EXCERPT MINING OPERATIONS - ROCKS	
Scarcity	EASE MEGA-LIKE OUTCROPS ENHANCE	3+
Scarcity	UNUSUALLY GRASSY UNULATING	
Cultural	CANOEFORM, LACKS TREES SHRUBS	3
Modification	NATURAL EXCERPT LACK OF MATURE VEGETATION, MOGULS	1

TOTAL = 15

SCENIC QUALITY FIELD INVENTORY

Date: 10 Aug	Study Site: Fova	Rehabilitated
Time: 8 AM	Rating Unit: 300 EA	Adjacent Undist.
		Location: CO

LANDSCAPE CHARACTER

	Landform	Vegetation	Structure
Form	SIMPLE BOLD DOMIN.	UNIFORM HORIZONTAL	
	ATING FORMS ROUND-	GENESS LAYER MADE	FENCES
	ED STEEPLY SLOPING	OF VERTICAL AND	
	IMPRESSIVE LARGE SHAPES	TANGLED MEMBERS	
Line	STEEPLY DIPPING UNIFORM	UNIFORM	LINEAR
	CURVED LINES OVER	COVERING NO	ARRANGEMENT
	LAPPING HORIZONTAL	LINES CREATED	OF POINTS
Color	BACKGROUND		
	COLOR YELLOW	MOSTLY GREEN-	SOME WNT
	GREEN OF VEGETATION	ISH W/ YELLOW	TYPED MOST
		BULTRONES	NEUTRAL
Texture	SMOOTH SIMPLE	FINE GRAMED	FINE
	FORMS CREATE RE.	HIGH DENSITY	
	GULAR TEXTURE	EVEN AND RANDOM	
	(SEE VEGETATION)	PATTERNING	

NARRATIVE

UNIFORMLY GRASSY PARCEL LOCATED CENTRALLY ON SITE. GRAZED, VERY HIGH ELEVATION (RELATIVELY) OFFERS VIEWS AND VISIBLE. LARGE STEEP LAND FORMS ROUNDED UNIFORM. PARCELS OF UNDIST. LAND CONTAINED WITHIN. FENCES & EQUIPMENT RELATED TO CATTLE ISOLATED FEELING.

	SCORE	
	Explanation or Rational	Rating
Landform	STEEP GRASSY PARCEL LOCATED CENTRALLY ON SITE. GRAZED, VERY HIGH ELEVATION (RELATIVELY) OFFERS VIEWS AND VISIBLE. LARGE STEEP LAND FORMS ROUNDED UNIFORM. PARCELS OF UNDIST. LAND CONTAINED WITHIN. FENCES & EQUIPMENT RELATED TO CATTLE ISOLATED FEELING.	2+
Vegetation	THATCH GRASSY PARCEL LOCATED CENTRALLY ON SITE. GRAZED, VERY HIGH ELEVATION (RELATIVELY) OFFERS VIEWS AND VISIBLE. LARGE STEEP LAND FORMS ROUNDED UNIFORM. PARCELS OF UNDIST. LAND CONTAINED WITHIN. FENCES & EQUIPMENT RELATED TO CATTLE ISOLATED FEELING.	1
Water	MORE GREEN THAN YELLOW	0
Color	UNIFORM BRIGHT GRAY	1
Adjacent	SCUBA PARCELS, VIEWS TO ADJ.	
Scenery	CULTURAL LANDS VALLEY	2+
Scarcity	ATYPICAL GRASSLANDS FORMS ON MT. TOPS	-
Cultural	POWER LINES BISECT OTHER	
Modification	WIDE CHARACTER UNMODIFIED	-

TOTAL = 2.5

SCENIC QUALITY FIELD INVENTORY

Date: 4/6/11, 8:55	Study Site: FOUR	Rehabilitated
	5403A	Adjacent Undist.
Time: 7:30 AM	Rating Unit:	Location: C0

LANDSCAPE CHARACTER

	Landform	Vegetation	Structure
Form	SIMPLE SLOPING	SINGULAR LINE	POWER
	STRIP SHAPED MOUND	HIGH LAYER	LINES
Line	IRREGULAR "U" SHAPED		
	CONTINUOUS BAND		
Color	UNEQUATING OR DIPPING	IRREGULAR	MULTI-
	HORIZONTAL GENTLE CURVING	PATCHES, SINGLE	LAYERED
Texture	DRILLAGE CONTAINED	CURLING GREEN	ADVANCED
	W/IN	PATH - DRAINAGE	LINES
	STRAW COLORED	MIXED / DIFFUSE	
	WITH GREEN SHADINGS	MUSSEY W/SHADES	WHT SIL-
	SEE VEGETATION	GREEN & TANS	VEG LINES
			DARK ROCK
	UNIFIED CONSISTENT	FINE GRAINED	FINE TO
	INITIAL FORM TO	UNIFORM DENSITY	COARSE
	DIVERSITY TEXTURE	SHUTLE SPECIES	PROBABLE
		DIVERSITY	ENT

NARRATIVE

NARROW DRAINAGE SWALE - DIPPING AREA. UNIQUE ROCK OUTCROP DIRECTLY ADJACENT TO WOODED SCRUBBY LAND / ISLAND. DIVERSITY OF VEGETATION GRASSES, FORBS SEEDLING TREES APPARENT ON CLOSE INSPECTION. IMPOUNDMENT AT BASE OF DRAW. CLOUDY COLD WEATHER. DEW AND GROUND IN AND AROUND. VEGETATION SHARPLY CONTRAST WITH NATURAL SWEET / ASPEN STAND ADJACENT.

SCORE

	Explanation or Rational	Rating
Landform	GULCHED WITH TROUGH BETWEEN SLOPING GENTLY CURVED, SEVERAL ROCK PILES	2
Vegetation	UNIFORM FINE TEXTURE GRASSES, FORBS & FLOWERS - DIVERSITY SPECIES MIXED CLUMPS	3+
Water	None	
Color	DULL GREEN & BROWN FLECKED YELLOW	
Adjacent	WHT PINKIE RUST MOUNTAIN FROM ABOVE	3+
Scenery	INTS. WHT ROCK OUTCROP, CROOK LAND	
Scarcity	RASH ATOP, POWLINE MOUNTAIN	2
Cultural	TYPICAL SCENIC LOCUS PINE - SPRUCE	
Modification	ASIN OF THIS ELEVATION HIGH CONTRAST	-
	ADJ TO SCENIC QUALITY EXCEPT	
	PINKIE LINE	-1

TOTAL = 8+

SCENIC QUALITY FIELD INVENTORY

Date: 11 AUG 88	Study Site: FVW	Rehabilitated
Time: 9 AM	Rating Unit: SNO 14H	Adjacent Undist.
		Location: CO

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	SIMPLE OPEN BASIN	CARPET OF SOIL	POWER
	LINE SOMEWHAT	LAYER BELOW	LINES
	DEFLECTED BY ENCLOSED	SPRAWLING TREE-	VERTICAL
	DRAINAGES	GULL SHAPED FORMS	MEMBERS
Line	GENTLE BOWL/CONCAVE	IRREGULAR	REGULAR
	LINE CURVE FORWARD	PATCHES LEAD TO	REPETITIONS
	ON EDGES	DIFFUSE TRANSIT.	PTS. STRAIGHT
		LOCAL EDGE	PATH
Color	PALE GREEN GREENISH	PALE GREEN	
	TURKY MOTTLED	SAGE, TAN GRASS/	SILVERS
	W/ TAN DRAB	SOIL FORESTORY	BROWN
	GREENS	DARKER EDGE	
Texture	SIMPLE STERILIZED	IRREGULAR RAD-	COARSE
	COMPLEX AT	DOM MED GRAIN	IN EDGE.
	EDGE DUE TO	RIND SMOOTH BENEATH	GROUND
	VEGETATION	SOMEWHAT SPARSE	

NARRATIVE

GRAZED 14H JUST OFF PERMIT OPEN TO
SOUTHWEST EAST HIGH RIDGE OFFERS
VIEWS OF MINE AND ACTIVITIES. UNIT
REPRESENTS SAGE & GRASS ECOTYPE
(LOWEST ELEVATION) NESTED BASIN
BETWEEN HIGHER ELEVATIONS. VIEWS
TO SURROUNDING AREA ABOVE AND BE-
LOW. BORROWS FROM ITS SETTING.
SAGE/GRASS BEATEN SIMPLE NOT MUCH
COMPLEXITY OVER GRAZED?

SCORE		
	Explanation or Rationale	Rating
Landform	LOW W/ MOUNTAINS SWALES OUTCROPS	
	ON PERIMETER ENCLOSED BARRICADE	2+
	SAGE & GRASS ECOTYPE	
Vegetation	SOMEWHAT BEATEN NOT MUCH DIVERSITY	2
	NONE	
Water		0
Color	GRAYS GREENS DRIVES TEXTURED LINE	
Adjacent	MULTI COLORED CARPET BARRICADE	1+
Scenery	HIGHLAND ASPENS, PINES ROCK	
	OUTCROPE RIDGES, VALLEY BELOW	3
Scarcity	TYPICAL FOR REGION	1
Cultural	NONE EXCEPT ANCHOR PATH.	
Modification	0 POWERLINES HARD TO IGNORE	-1

TOTAL = 9

SCENIC QUALITY FIELD INVENTORY

Date: 11 AUG 85	Study Site: Four	Rehabilitated
	SA 02 AU	Adjacent Undist.
Time: MID MORN	Rating Unit:	Location: 10

LANDSCAPE CHARACTER		
	Landform	Vegetation Structure
Form	SLOPING EDGED	COMPLEX IRREG.
	PLACES, SADDLE-LIKE,	GRASSY LAYERED
	FORMS TRANSITION	TO ROUNDED TO
	FROM VALLEY TO RIDGE	SCRAMBLED
Line	UNDULATING OR	CLUMPS, PATCHES
	SEEMING PURE.	MASSIVE GREYS
	LEARNING	DIFFUSE TRANSI.
		TIONAL EDGES
Color	MIST Y THIN SOIL	SHINY GREENS
	ENHANCEMENTS (SEE	YELLOW SAGES
	VEGETATION)	BUSHES, GRASS
		OF GREENS
Texture	SOMEWHAT COMPLEX	MID TO COARSE
	BUT SMOOTH, COARSE	GRAIN CONTRAST
	ED BY VEGETATION	W/ FINE SMOOTH
		IRREGULAR RANDOM

NARRATIVE

SAME AREA AS SA 02 AU BUT HIGHER ELEVATIONS. HILL SIDE LOCATIONS SURROUNDING SMALL BASIN AREA. SCRUBBY SHrub VEGETATION TO APPX. 15 FT CHERRY OAKS ETC. DOMINANT BUT SAGE GRASSES UNDERFOOT. SLOPING FLAT BELOW INCREASING ABOVE. COVER FOR WILDLIFE. SURROUNDED BY OUTCROPS. CONFINED PRIVATE HIDDEN SPACES OCCASIONAL FRAMED VIEWS. TILES ON PLACES OF RIDGE, HILL SIDE.

SCORE		
	Explanation or Rationale	Rating
Landform	SLOPED SHOULDER, PLANKS, FLANGES	
	TEAR SLOPE STEEP ROUNDED EDGES	3+
	SCRUBBY SHrub SAGE GRASSES	
Vegetation	GRASSY CLUMPS OR GRAY BROWN GRASS	3+
Water		0
Color	SILVER SAGE YELLOW GRASS SHINY	
Adjacent	GRASS HEAVY OVER LIE TEMPERA PAINTS	3
Scenery	GRASSLANDS BELOW IN VALLEY RENAS	
Scarcity	DESERT V SHARP VALLEY POWERLINES	2
Cultural	TYRICAL FOR REGION	
Modification		1
	NO EXCEPT EDW PATH	0

TOTAL = 12+

SCENIC QUALITY FIELD INVENTORY

Date: 11 AUG 88	Study Site: FOUR	Rehabilitated
Time: LATE MORNING	Rating Unit: SN 0314	Adjacent Undist.
		Location: CO

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	SLOPING "V" SHAPED	TALL NARROW	
	DRAINAGE OBSCURED BY VEGETATION, SOME HORIZONTAL ROCK OUTCROPS	IRREGULAR FORMS, BARK THICK, UNDIFFERENTIATED MASS	NONE
Line	SLOPING BUT CO- SLUGGED BY VEGE- TATION	STRECH VERTICAL, WITHIN, THERE NON- DISTINCT MASS WHEN VIEWED	
	INDICATED BY VEGETATION LIGHT	HIGH CONTRAST DARK GREEN	
Color	MED. GREEN FROM DISTANCE, SANDY COLORS COVERED BY VEGETA- TION EXCEPT OCCASION- AL ROCK RIM WHICH COARSELY CONTRASTS	A WHITE YELLOW D RED ACCENTS MEDIUM, FINE CONTAINED WITH- IN, IRREGULAR DENSER COVERAGE	
Texture			

NARRATIVE

Aspen ecotype. thicket of tall dense quivering trees. Intensely green w/ stark white bark, shadowy dark with sky views and sunlight sparkling through. Deer beds nested in grass. Mysterious detailed understory plants. As much unattached as attached wood. Confined private hidden - hard to penetrate, navigate through. Some bare rock outcrops within.

SCORE		
	Explanation or Rationale	Rating
Landform	SLICKING OF ROCK ON FLAT NARROW RING RIPPED AROUND LOWER MASH, OUTCROPS	3
Vegetation	WOODY THICKETS UNDERSTORY DIVERSE VIBRATING LEAF, STEM & BARK TEXTURES	4
Water	NONE	0
Color	DARK OLIVES W/ BARKS CONTRAST BLUE- GREEN PAINT YELLOWS, SATURATED	3+
Adjacent	CURTAIN OF TREES BLOCKS ADJACENT	
Scenery	SCENERY SOME FLEETING VIEWS MAREGREEN	1+
Scarcity	TYPICAL FOR REGION	
Cultural	NO CULTURAL MODIFICATIONS APPARENT	1
Modification		0

TOTAL = 13

SCENIC QUALITY FIELD INVENTORY

Date: 26 JUL 88	Study Site: FIVE	Rehabilitated
Time: 8 AM	Rating Unit: SAOIR	Adjacent Undist.
		Location: WY

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	LARGE SIMPLE	SINGLE CAN.	POWLS
	FORMS HILL SLOPE	THICKUS GRASSY	POLES
	FLAT BOTTOM LAND	LAVER HORIZON	ADS
Line	FLAT TOPPED HILL	THE COVERING	
	HORIZON WITH UNIFORM	UNIFORM EX	VERTICAL
	SLEEPING SIDES ROLD	CERT FOR DIFFUSE	ELEMENTS
Color	COMPLETS ONLY WITH DRAINAGE	CREED AND	PUNCTUATE
	LIGHT TO MED	EMERALD GREENS	LANDSCAPE
	STRAW COLORS	DOMINATE LOW AREAS	DECK
Texture	STRATIFIED GREENS	DIFFUSE BUT DISTINCT	TALL
	PALE SKY	LY GIVE WAY TO TAMS	PTS-NEU-
	UNIFORM SMOOTH	FINE GRAIN	FINE IN
	LANDFORMS	UNIFORMLY DENSE	DISTANCE
		EVENLY SAME	COARSE IN
		WHAT ORDERED	FOREGROUND

NARRATIVE

Enbelle Creek reconstruction. Landform recreated/reconstructed alluvial valley floor. Rating area includes pronounced flat top hill with uniformly sloped sides. Flat drainage area flows through from pond. Pond exceptionally depleted and contains snags for waders. Antelope sits ducks 11029-11030.

SCORE		
	Explanation or Rational	Rating
Landform	PRONOUNCED EDGE ABRUPTLY SLOPES TO DRAINAGE, TERNED FORMS CENTRAL STREAM	1
	DRY GRASSY SIDES DOTTED W/ BUCKS	
Vegetation	DETAILED GREEN THICKER GROWTH LOWER STAGNANT LOOKING BUT SURROUND.	3+
Water	ED BY GREEN - VERY DRY	2
Color	UNIFORM YELLOW/TAN GREENS CREED	
Adjacent	FORM DRAINAGE NAZY GRAY LNT STRAW	1+
Scenery	POWER LINES IN RECONSTRUCTED MOORE	
Scarcity	RECLAIMED	0
Cultural	COMMON IN DISTANCE GREEN SWALL	
Modification	SUGGEST COOLNESS VIGOR	1
	POWER LINES INTERRUPT PARTIAL VIEW	-

TOTAL = 7

SCENIC QUALITY FIELD INVENTORY

Date: 26 JUL 88	Study Site: FIVE	<input checked="" type="checkbox"/> Rehabilitated <input type="checkbox"/> Adjacent Undist.
Time: 9 AM	Rating Unit: 8A 02 K	Location: WP

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	SIMPLE UNIFORM	GRASSY	
	CONTINUOUS	FEATHER	
		DENSE CLUMP	
Line	HORIZONTAL	GREEN FINGER	
	CONTINUOUS	KEEN UPSLOPE	
	CURVILINEAR	FROM DRAINAGE	
Color	PERCEFUL	OTHERWISE NO USE	
	OVER ALL STRAW	BUFF YELLOW	
	YELLOW GREEN	GRASSES	
Texture	UNDER TONES	STRAIGHT WITH	
	(SEE UPG)	DIFFUSE GREEN	
	SIMPLE ROOF	FINE GRAINED	
	COHESIVE	UNIFORM EVEN	
		COVERAGE	

NARRATIVE

LOW ROUNDED GENTLE HILLS SEPARATED BY SMOOTH UNIFORM DRAINAGE (LOWLAND) PATH. VERY LUSH THICK & HEALTHY GRASSES. LAND FORMS SEA SAW NATURALLY ANTELOPE UNCOMMONLY ABUNDANT. AREA HAS AN OPEN PARK LIKE FEELING, ROCK PILES ARE FEW AND UNOBTRUSIVE. ROCKING SCENE OF GRASS. SKYS DULL GRAY HAZE FROM PILES TO THE WEST (yellowstone).

SCORE		
	Explanation or Rational	Rating
Landform	NATURALLY SLOPING OPEN RANGELAND	
	PAGE FEW ROCKPILES UNDOULATING	1+
	THICK GRASSES, LITTLE, KNEE HIGH	
Vegetation	UNIFORM, NATURAL APPEARANCE	3
	NOCC	
Water		0
Color	UNIFORM ONLY YELLOW WITH GREEN	
Adjacent	DIRTIES VERY PALE YELLOW MIXED	1
Scenery	POWER POLES, DISJOINT PERCEFUL	
	OPEN RANGE FEELING	0
	GRAND FORM TYPICAL VEGETA	
Scarcity	NOT UNIQUE, INTERESTING WILDLIFE	1
Cultural	MOST UNOBTRUSIVE BUT CULTURE	
Modification	BECOMES FOCAL PT FROM MANY LOCATIONS	

TOTAL = 5

SCENIC QUALITY FIELD INVENTORY

Date: 26 JUL 88	Study Site: FIVE 64032	<input checked="" type="checkbox"/> Rehabilitated <input type="checkbox"/> Adjacent Undist.
Time: 10 AM	Rating Unit:	Location: WY

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	Simple rounded	SHRUBS W/	FENCE
	Hill side form	SPREADING GLOBE	
		FORMS, SPIKET	
		FEATHERY GRASSES	
Line	SOLO SINGULAR	UNIFORM	VEGETATION
	HORIZON LINE	MIXED NO DIS	TRACES
	UNIFORM CONTOUR	TINNY LINE EXCEPT	
		HORIZON	
Color	LANDFORM COLOR	BRIGHT LIGHT	REINHL
	IS TAKEN FROM	GRASS STRAW	
	VEGETATION	COLORS PL PALE	
	UNIFORM DRY GREEN	YELLOW GREEN	
Texture	SIMPLE CONTINUOUS	SCUFFY SCUFFY	FINE
	LANDFORM SMOOTH	TEXTURE MED -	
	TEXTURE	COARSE UNIFORM	ORDERED
		DENSITY	

NARRATIVE

Older ESTABLISHED REHABILITATED
LAND (REVEGETATED 1978) Subject to short
duration HIGH INTENSITY grazing. NO JN.
LEFT TO UNDISTURBED LAND (BACID AU)
HARD TO DISTINGUISH REHABILITATED FROM
ADJACENT UNDISTURBED IF NOT FOR FENCE.
MATURE TALLER (WHIST HIGH) VEGETATION.
VERY ONLY GRAY SMOKE FILLED SKYS. CANYON
COWS BIRDS. FENCED-

SCORE		
	Explanation or Rational	Rating
Landform	GENIE. HILLSIDE ROUNDED	1
Vegetation	MAJORITY SHRUBS, TALL GRASS VARIETIES GROUND COVER MAT, DIVERSITY 100 WATER REQ WATERING TANKS	3+
Water	HEALTHY GREENS STRAW GRASSES DARK GREENS IVORY SEED HEAD GRASS	2+
Color	LANDS ADJACENT QUIET INFLUENCE	1
Adjacent	(DISTANT MINING ACTIVITIES EXCEPTED)	1
Scenery	UNCOMMON TALL THICK VEGETATION	1+
Scarcity	TYPICAL LAND FORM VEG. INTERESTING	1+
Cultural	ROCKPILE ROADS INSIGNIFICANT COWS	0
Modification	NICE TOUCH DISAPPEARING IS DISTANT	0

TOTAL = 9+

SCENIC QUALITY FIELD INVENTORY

Date: 25 JUL 88	Study Site: Five	Rehabilitated
Time: 7:30 PM	Rating Unit: BACIU	X Adjacent Undist.
		Location: WY

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	MOSTLY FLAT WITH GENTLE	LEVEL GRASSY	
	ROLLING DRAINAGE(S)	BLANKET COVERED	
	SOME RUGH SURFACE	W/SPREADING CLIMAX	
	ROCK RUBBLE	SAGE	
Line	HORIZONTAL DRAINAGE	DRAINAGE	
	CUTTING OCCASION	CREATES BRAD	
	WELL TREGGED	DENSE CUTTING	
		LINE	
Color	CREATED BY VEGETA.	VARIOUS	
	TION BUT OCCASIONAL	GREENS GRAYS	
	BLUE SOILS & YELLOW	DRY GRASS, FAIRLY	
	CHARGE BROWN ROCKS	UNIFORM	
Texture		MED TO FINE	
	CREATED BY VEGETA	GRAIN, KNOWN	
	TION LAND FORMS AN	TO RANDOM ARRANGEMENT	
	INTERMEDIATE WHOLE	COARSE LUMPY	

NARRATIVE

Area North of permit. Higher elevation. Views of mining operations. Criss-crossed with roads, tracks, power poles. Contains cattle stock pond. Appears to be "disturbed" undisturbed land. Apparently used for access, grazing, maintenance. VEGETATION IMPACTED, RUTS & TRAILS ABUNDANT CATTLE. FROM DISTANCE APPEARS SIMILAR TO OTHER RECLAIMED AREAS. STOCK POND CONTAINS DUCKS.

SCORE		
	Explanation or Rational	Rating
Landform	FIRING HILLS DRAIN TO POND SCATTERED RUGGLE FLAT TERRAIN GENTLE SLOPE CATTLE GRASS SAGE. WOODY STEMS, LUSH	1+
Vegetation	GRASS IN DRAINAGE, COARSE LUMPY	3+
Water	STOCK POND WITH REEDS CATTLE QUIET STILL	2
Color	TAN SOILS, SIENNA ROCKS, SAGE GREENS, GRAY GRASSES, GREENWOODY STEMS, GRASS, BLUE	1+
Adjacent	MINING OPERATIONS, SILT, ROAD, FENCES	
Scenery	LANDS CLATTER, BAKES NEGATIVE, COMMON BUT UNCOMMON INDUSTRIAL	-1
Scarcity	SETTING	0
Cultural	ROADS, RUTS, PATHS, POWER POLES	
Modification	MINING CRAP	-2

TOTAL = 6

SCENIC QUALITY FIELD INVENTORY

Date: 26 JUL 88	Study Site: FIVE	Rehabilitated
Time: 6:30 PM	Rating Unit: BA 02 AD	Adjacent Undist.
		Location: WY

LANDSCAPE CHARACTER		
	Landform	Vegetation
Form	STEEP VERTICAL	LOW CLUMP
	RELIEF AT MOUND	FEATHERY RICH
Line	CANTILE STEPPED	VELVET CARPET
	TERRAZED LAYS HORIZONTAL	
Color	STRONG HORIZONTAL	FOLLOWS
	CURLING OR GENTLY	MEANDERS & CURVES
Texture	MEANDERING RABBIT	OF TOPOGRAPHY
	VERTICAL EDGE	SWEEPING CURVILINEAR
	BUFFS, WHITE	SILVER GRAY
	SOME YELLOW ORANGE	SAGES, LIMET
	GRAY	RICH GREENS
		FANS JUCKYS
	DISTINCT ORDER	FINE TO MED
	ED BOLD CLEAR	FINE VARIING
	ABRUPT TO SMOOTHED	DENSITY DIVERSE
		RANDOM DISTRIBUTION

NARRATIVE

FORMER RANCH, NOW OWNED BY MINING COMPANY. SHOWS SOME EVIDENCE OF GRADING. INTERMITTENT STREAM BED / CREEK DRAINAGE WITH SCARP. FOCUS OF RATING UNIT. PEACEFUL SHELTERED DECUHOED QUIET. INTENSE GREEN GENTLY MEANDERS NEXT TO HIGH CRUMBUNG SAND STONE. WAVES OF THICK HEALTHY GREAT SMELLING SAGE. JACKRABBITS

SCORE		
	Explanation or Rational	Rating
Landform	INTERESTING EROSIONAL PATTERN DOMINATES	
	SCENE NOT EXCEPTIONAL, SCARP, TERRACE PLAINS	3+
Vegetation	WAVES OF SAGE GRASS & CACTUS EXCEPT	
	USUALLY GREEN IN SWALES BARE SOIL	4
Water	NO WATER BUT SUGGESTION STRONG	
	CONSIDERING DRY SURROUNDINGS	2
Color	SILVER GRAYS GREENS, TANS W/NT BUFFS	
	YELLOW ORANGE, MUD POWDERY GRAY	4
Adjacent	RATING AREA SHELTERED CREEK	
	DRAINAGE (MINING CRT'S ELEVATED	0
Scarcity	INTERESTING BUT COMMON, DISTINCTIVE	
	ENOUGH TO BE SEEN FROM FARAWAY	2
Cultural	EITHER INSIGNIFICANT (ROAD #20	
	MONITORING) OR SLIGHTLY INTERESTING	+

TOTAL = 16

SCENIC QUALITY FIELD INVENTORY

Date: 26 JUL 88	Study Site: Five	Rehabilitated
Time: 7:30 PM	Rating Unit: 5A03 AU	Adjacent Undist.
		Location: WY

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	Prominent rounded	Low rounded	Varied
	form rise relatively	clumps but mostly	cubic
	from flat or rolling	layer grass	linear
	topography rounded	covering	forms
Line	mostly horizontal	diffuse	
	intermediate smooth	irregular or	granular
	bold distinct	not distinct	4 horizontal
	forms	linear patterns	
Color	rusty volcanic	grassy flat	
	tints other wise	green yellow	varied
	colored w/vegetation		
Texture	medium texture	uniform	varied
	smooth and	fine med	
	sparsely piled	fine grasses	
	landforms	some clumps	

NARRATIVE

Views of Skowon Hills west of permit area. Semi residential area bisected by highway. Unique land forms. Most evaluation done from road. Land use is agricultural (hay) ranching (cattle grazing). Included fences, homesteads, commercial development signage (rural development) poles etc. Generally unplanned. Unnatural yet so common normally unnoticed.

SCORE		
	Explanation or Rationale	Rating
Landform	cone shaped to flatter smooth rounded rise from flat lands (slovia)	3
Vegetation	dry grassy relatively uniform some sage	2
Water	none	0
Color	thunder sky, yellow green some blue gray some terra cotta charcoal	1+
Adjacent	approach to city includes various development that impairs quality	-1
Scarcity	unusual for geographic province but typical for region	2
Cultural	typical rural development not	
Modification	usually noticed customarily but unattractive	-2

TOTAL = 5+

SCENIC QUALITY FIELD INVENTORY

Date: 28 Jul 88	Study Site: Six	<input checked="" type="checkbox"/> Rehabilitated
Time: 8:30 AM	Rating Unit: R501 R	<input type="checkbox"/> Adjacent Undist.
		Location: MT

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	Simple Unified	Homogeneous	
	Landform	Carpet like	NO SCENE
Line		Horizontal + hatched	None
	Horizon line	No lines	STRUCTURES
Color	Water w/ Poles	CREATED BY	
	Straight Smooth	VEGETATION	
Texture	LAND FORM TAKES	UNIFORM	
	COLOR FROM	MONOTONE	
	VEGETATION	BEIGE TAN	
	SIMPLE SMOOTH	FINE HIGH	
	TEXTURE COARSE	DENSITY	
	EDGE BORROWED	UNIFORM COVER	
	FROM SURROUNDINGS		

NARRATIVE

Hillside reclamation rises to ridge of ponderosa pines. Mining operations in the distance below. Hillside is steep towards top of ridge gradually flattening below. The blending of the topography is carefully done. The vegetation is uniformly beige dry brown. very dry.

SCORE		
	Explanation or Rational	Rating
Landform	RIDGE BEHIND BASIN HIGHER LIMITS OF SLOPE UNIFORM BUT STEEP DRAINAGE SCOPED FLAT IN BOTTOM	1+
Vegetation	UNIFORM GRASS VARIETIES TEXTURES UNIFORM	
	MISC. FORBS	1+
Water	NO WATER	
	UNIFORM BEIGE NITRIFIA BELOW DEP	0
Color	GREEN	1
Adjacent	SCENERY CHANGES PONDOROSA RIDGES	
Scenery	MINING OPERATIONS BELOW EXCEPTED	1
	EXCEPT FOR INCL OF MATURE TREES	
Scarcity	THIS SCENE COMMON	1
Cultural	NO SIGNIFICANT SCENE	
Modification	SOIL EROSION	0

TOTAL = 6

SCENIC QUALITY FIELD INVENTORY

Date: 28 JUL 88	Study Site: SIX	Rehabilitated
Time: 10 AM	Rating Unit: ROBER	Adjacent Undist.
	Location: MT	

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	UNIFORMITY BENT	VARIETY FORMS	
	SLOPES FINE SMOOTH	CLUMPS NGUDED	WIND
	HORIZONTAL LAND	ELONGATED FEATHERY	WINDS
	FORMS	GRASS GRASSES	ROCKS
Line	HORIZONTAL WITH	DIFFUSE	ROAD
	SOME UNDULATIONS	NO LINES	ISOLATED
	IN BACK GROUND	CREATED	POINTS
Color	ALLENING TAN	BOTTLED GREEN ON	NEUTRALS
	AND GREEN	TAN SHINY DARK	DARK
	(SEE REG)	GREEN FORMS LINES	TO MED.
		ACROSS WATER	BLEND WELL
Texture	SPICED IN ROUGHEN	FINE W/ISOLA-	
	IN DISTANCE	TED COARSE	
		ELEMENTS, UNIFORM	
		LY DENSE	

NARRATIVE

OLDER RECLAMATION 1979 WITH
MATURE VEGETATION / DIVERSITY. AREA CON-
TAINS SEDIMENTATION ROAD W/ WET LANDS
PLANTS. SMALL STAND OF COTTONWOODS
GROWING FROM SHALLOW DEPRESSION AND
WIND MILL WITH WATERING TANK. CENTE-
ALLY LOCATED AMONGST MINING RELATED
STRUCTURES BUT WITH RANCH LIKE CHARACTER

SCORE		
	Explanation or Rational	Rating
Landform	LOW ROLLING HILLS, OR FLAT SMOOTH ROCK RILE W/ SAGS, DRAINAGE SWALE	1
Vegetation	MATURE SHRUBS, GRASSES & FLOW DIVERSITY FEW TREES & MARSH PLANTS	3+
Water	WINDMILL OVER FLOW, GRASS POND STILL QUIET	2
Color	TAN OVER DRY GREEN, DARKEN	
Adjacent	GREENS SHINY COTTONWOODS BUNDLES	2
Scenery	BUFFALO PASTURE TRAINING OATS	
Scarcity	HARD TO IGNORE IN DIST. DEVELOP	0
Cultural	THICK SALT GRASS ATYPICAL (m)	
Modification	ELEMENT INTERESTING	0
	FENCES AND WINDMILL QUEUED	
	ADPTO SCENIC QUALITY	2

TOTAL = 104

SCENIC QUALITY FIELD INVENTORY

Date:	Study Site: Six	Rehabilitated
Time: LATE AM	2003 R	Adjacent Undist.
Rating Unit:		Location: MY

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	ROLD SIMPLE	LOW HORIZON	
	FORE GROUND FORM	TAL GRASSES	EROSION
	ALERTY ON EDGES	GREEN BUSHES	CONTROL
	UNDULATING TO	SEEDLING TREES	
Line	FLAT	REGULAR ERASER	
		LINES	
			LINER
			PATTERNED
Color	LIGHT TANS GIVEN	TANS GRAYS	SEQUENCE
	BY VEGETATION	JUDY SPARKLED	
		GREEN SPOTS	REDDISH
			ROCK
Texture	HOMOGENEOUS	TAN & GREEN	COARSE
	SEE VEGETATION	PATTERN FINE	ON CASE
		GRAIN, DENSE	INSPECTION
		UNIFORM W/ COLEA	

NARRATIVE

(55-06)
 FAIRLY RECENT REHAB ADJACENT TO
 NATURAL CLIFF/HIGH PT. COVERED WITH
 MATURE PINES. SURROUNDS KMA. YONG
 PONDROSA ESTABLISHED HERE WITH APPA-
 RENT SUCCESS. ACCESS ROAD LEADS OFF
 SITE. SOO GRASS UNDERSTORY EXCEPTION.
 ALLY DRY. OFFERS GREAT VIEWS VERY
 VISIBLE. TEXTURE LINE FORM & COLOR
 DIFFERENT THAN SURROUNDING UNDIST. LAND

SCORE		
	Explanation or Rational	Rating
Landform	STEEP SLOPED HILLS INTERSECTED	
	WITH ROUNDS DRAINAGE	1+
Vegetation	TRANSPLANT PONDROSA AND	
	SOO GRASSES JUNIPER	3+
Water	ROAD	
	GRAY TURF TISED GREEN	0
Color		
Adjacent	MOST EXHIBITS VALLEY FLOOR	1
Scenery	DISTANT VIEWS PINES / SCORIA, LACS	
	NORMAL FOR REGION	3
Scarcity		
Cultural	NO FENCE POST, EROSION CONTROL	1
Modification	LITTLE ERASER FAMILY INSIGNIFICANT	0

TOTAL = 10

SCENIC QUALITY FIELD INVENTORY

Date: 29 JUL 88	Study Site: Six	Rehabilitated
Time: 6302 pm	Rating Unit: K00120	Adjacent Undist.
		Location: MT

LANDSCAPE CHARACTER

	Landform	Vegetation	Structure
Form	HORIZONTAL WITH	TALL CONICAL TO	
	CONICAL TREE	SPREADING	
	COVERED RIDGES	SMALL CLUMP	
	HILLS	SCATTERED	
Line	UNITS, MOSTLY	FOLLOWS DRAIN	
	HORIZONTAL DRAIN	AGE HORIZON	
	BROKEN UNEVEN	A HILL TOP	
		3 BROAD PATTERNS	
Color	COLORS CREATED	DARK GRAY GREENS	
	BY VEGETATION	TO PALE BEIGE	
		SILVER IN BG	
		TWEEN	
Texture	COARSE AT EDGES	VARIES FROM	
	EVEN UNIFORM	GRAIN GRADUALLY	
	WITHIN	GIVES WAY TO FINE	
		RANDOM UNEVEN	

NARRATIVE

Area is directly north of permit
which separated by road only. Similar
in form to rehabilitated land. Flat -
ish gently sloping to forested
areas where topography is more
hugged & ground hugging grasses less.
"FLAT" AREAS HAVE STRAIGHT, MINOR
APPEARANCE TOOK BY PILES & ROCKS
DEG. GROWS IN PATTERNS - GRASSES w/ SAGE
CLUMPS TO LOW SHRUBS TO TREES.

SCORE

	Explanation or Rational	Rating
Landform	SOME DIVERSITY DRAINAGE w/ BANK	
	CUTS, EROSION STORM KNOBS, RIMMERS	2
Vegetation	PONDROSA TO SHRUBS TO SAGE VERY	
	RAY GRASS, DRAINAGE GREEN	4
Water	None (indication, GLACIER MOUNTAIN)	0
Color	PALE YELLOW BLUE SKY DARK PINES, SILVER AND GREEN ON MOUNTAIN, BROWN	2
Adjacent	Mountains but so distant hardly	
Scarcity	None	0
Scarcity	Typical F&B Region	1
Cultural	TRAILING ROADS, WATER MONITOR	2
Modification	100 FEET	2

TOTAL = 9+

SCENIC QUALITY FIELD INVENTORY

Date: 29 JUL 88	Study Site: S1A	Rehabilitated
Time: 7:30 PM	Rating Unit: R002 AU	Adjacent Undist.
		Location: MT

LANDSCAPE CHARACTER			
	Landform	Vegetation	Structure
Form	SIMPLE OPEN	CONICAL TO	
	FOREGROUND FOR	CANYON LIKE	VARIED
	INCREASINGLY COM-	MIXED EDIMS	CHAIR
	PLEX SURROUNDINGS		WIDEN PTS
Line	RESTLESS	PILZAR TO	
	HORIZONTAL	TO HORIZONTAL	NOT
	DIVERSITY NORM	TO DIFUSE	DISTINCT
	DOWN	A PATCHY	
Color	TAKEN FROM	VARIOUS GREENS	
	PLANTS GOLD	IN LAVERS ON	NATURAL
	TAN DARK	BOLDEN GRASSES	
	GREEN HIGHLIGHTS	SILVER SAGES	
Texture	MED TO COARSE	VARIED COARSE	
	GRAIN FLAT SMOOTH	TO VERY FINE	VARIED
	SETTLING	MIXED RANDOM	
		UNEVEN ARRANGEMENT	

NARRATIVE

TO THE WEST AND INCREASING IN ELEVATION - THIS RATING UNIT INCLUDES SOME OF THE LAND USES PRESENT BEFORE MINING ACTIVITIES AND THOSE LIKELY AFTER MINING AS WELL (GRAZING, SOME AGRICULTURE RURAL RESIDENTIAL). LAND FORM LONG, NARROW PLAIN WINDING HIGHER & HIGHER OVER PASS BETWEEN LOW MOUNTAINS. DIRT ROAD, FENCE ROWS, CATTLE COMMON. INCREASING COMPLEXITY IN VEGETATION PATTERNS AND TEMPERAMENT

SCORE		
	Explanation or Rational	Rating
Landform	FLATISH AREAS AMONG ROLL OUTCROPS IN VALLEY LIKE OASIS IN MT IS BACKGROUND	2+
Vegetation	MIXTURE CROPS HAY ALFALFA PINES SHRUBS SAGE GRASSES VARIETY	4
Water	NONE	
Color	GREENS & GOLDS BUCKS DE GREENS	0
Adjacent	LAND USE CREATES PATCH WORK CONTRAST	3+
Scenery	MOUNTAIN BACK DROP TO PASTORAL SETTING LIKE LANDSCAPE PAINTING	3
Scarcity	TYPICAL FOR REGION	1
Cultural	RUB LIVESTOCK FENCES ENLIVEN	1
Modification	ADD INTEREST, FARMS HOUSES ETC.	1

TOTAL = 15

SCENIC QUALITY FIELD INVENTORY

Date: 29 JUL 88	Study Site: S11	Rehabilitated
8:00 AM		X Adjacent Undist.
Time: SUNDOWN	Rating Unit: R803A4	Location: MT

LANDSCAPE CHARACTER			
Form	Landform	Vegetation	Structure
	STEEN IRREGULAR	VARIED TALL	
Line	FOOT HILLS INDISTINCT	CONICAL COVERING	THICK
	BENIGN DIVERGENT VALLEY	ROUNDED SHAPE	
Color	LIKE FOREGROUND	MASSIVE LAYERS	
	IRREGULAR BROWN	DIFFUSE LAYERING	
Texture	JAGGED AND WADY	FOREGROUND TO	
	LAYING	BACK AS ELEVATION	
		TION INCREASES	
	NEUTRAL SHADUES	VARIETY CONTRASTS	
	SHUES TO DARK	HIGHTENED	
	GRAY GREENS	BY TIME OR	
	GENERALLY	DAY	
	MED END TO	MEDIUM TO	
	COARSE STILL	COARSE GRAIN	
	SOMEWHAT SMOOTH	VARYING DENSITY	
	SOFTENED	UNEVEN RANDOM	

NARRATIVE

Rating unit represent
 LANDSCAPE THAT SURROUNDS MINING
 ACTIVITIES - LANDSCAPE OF HIGHER
 ELEVATIONS MORE TOPOGRAPHIC DIVERSITY
 & HIGHER PERCENTAGE TIMBER - ALL OF
 WHICH WILL BE INCREASINGLY CHARACTER-
 ISTIC OF AREAS MINED RECLAMATION
 INCREASING BY BASED ON THIS VARIATION
 OF LANDSCAPE -

SCORE		
	Explanation or Rational	Rating
Landform	FOOT HILLS BREEKS, FLAT W/ DIVERSITY IN BACKGROUND, ROUGH OUTCROPS	3
Vegetation	MULTI LAYER GRASSES EVERGREEN FORESTORY VARIETY FORMS	4
Water	None	
Color	HINTS GRAYS PINKS IVORY GREEN	2
Adjacent	PALE GREEN AND SILVER DRY COLORS	3+
Scenery	HOMOGENEOUS, SOME INCREASING DIVER- SITY QUIET BACKGROUND	2
Scarcity	NO UNIQUE FEATURES TO MAKE EXCELLENT	
Cultural	LOCAL HINTS OF MOUNTAINS TO WEST	1+
Modification	ACCENTUATE HIGHLIGHTS IN SCENE LANDSCAPE FENCE RAILS SHED	1

TOTAL = 15

APPENDIX C
Statistical Analysis

T-SCORE VALUES

Landscape Factor: Total Scores

SCORES

T-SCORE COMPUTATION

Number of Scores(n) Rehabilitat- ed Land (X_r) Undisturbed Land (X_u)

1	10	5.5
2	5	6
3	6	6.5
4	6	10.5
5	5	10.5
6	10.5	6
7	8	6.5
8	6	16
9	9.5	6.5
10	6	13
11	4	12.5
12	6.5	9.5
13	6	15
14	10.5	15
15	10	9
16	15	12.5
17	6	12
18	8.5	—

$$t = \frac{\bar{X}_r - \bar{X}_u}{\sqrt{\frac{\sum X_r^2 + \sum X_u^2}{n_r + n_u} - \frac{(\sum X_r)^2}{n_r} - \frac{(\sum X_u)^2}{n_u}}}$$

$$t = \frac{-2.511}{\sqrt{\frac{337.087}{33} (.144)}}$$

$$t = \frac{-2.327}{\sqrt{\dots}}$$

*For df = 33, p < —

$$\begin{aligned} \sum X_r &= 138.5 & \sum X_u &= 173.5 \\ \bar{X}_r &= 7.694 & \bar{X}_u &= 10.205 \\ \text{std.}_r &= 2.771 & \text{std.}_u &= 3.592 \\ n_r &= 18 & n_u &= 17 \end{aligned}$$

*Significance derived from a non-directional (two-tailed) test.

T-SCORE VALUES

Landscape Factor:

Landform

SCORES

T-SCORE COMPUTATION

Number of
Scores(n)

Rehabilitat-
ed Land (X_r)

Undisturbed
Land (X_u)

1	1	2.5
2	1	1
3	1	1
4	1	1.5
5	1	4
6	1.5	1
7	1	1.5
8	1.5	3.5
9	1	3
10	1	2
11	1	1
12	1	2
13	1.5	2.5
14	1	3
15	1.5	2.5
16	3	3
17	2	3
18	2	3

$$t = \frac{\overline{X_r} - \overline{X_u}}{\sqrt{\frac{\sum X_r^2 + \sum X_u^2}{n_r + n_u} - \frac{n_r \cdot n_u}{n_r + n_u - 2}}}$$

$$t = \frac{-1.902}{\sqrt{\frac{19.539}{33} (.144)}}$$

$$t = \frac{-3.482}{\sqrt{\frac{19.539}{33} (.144)}}$$

*For df = 33, $p < .01$

$$\begin{aligned} \sum X_r &= 24 & \sum X_u &= 38 \\ \overline{X_r} &= 1.333 & \overline{X_u} &= 2.235 \\ \text{std.}_r &= .541 & \text{std.}_u &= .953 \\ n_r &= 18 & n_u &= 17 \end{aligned}$$

*Significance derived from a non-directional (two-tailed) test.

T-SCORE VALUES

Landscape Factor: VEGETATION

	SCORES	
Number of Scores(n)	Rehabilitated Land (X_r)	Undisturbed Land (X_u)

1	3.5	3
2	2	1
3	2	4
4	2	3.5
5	2	1
6	4	2
7	3.5	3.5
8	3	4
9	3.5	2
10	3	4
11	2	4
12	3	4
13	1.5	4
14	3.5	4
15	3.5	2
16	1	3.5
17	1	4
18	3.5	

$$\begin{aligned}\sum X_r &= 47.5 & \sum X_u &= 53.5 \\ \bar{X}_r &= 2.638 & \bar{X}_u &= 3.147 \\ \text{std.}_r &= .951 & \text{std.}_u &= 1.100 \\ n_r &= 18 & n_u &= 17\end{aligned}$$

T-SCORE COMPUTATION

$$t = \frac{\bar{X}_r - \bar{X}_u}{\sqrt{\frac{\sum X_r^2 + \sum X_u^2}{n_r + n_u} - 2 \frac{\sum X_r \cdot \sum X_u}{n_r \cdot n_u}}}$$

$$t = \frac{-1.509}{\sqrt{\frac{34.774}{33} (.144)}}$$

$$t = \frac{-1.471}{\sqrt{\dots}}$$

*For df = 33, p < .50

*Significance derived from a non-directional (two-tailed) test.

T-SCORE VALUES

Landscape Factor: WATER

SCORES

T-SCORE COMPUTATION

Number of Scores(n) Rehabilitated Land (X_r) Undisturbed Land (X_u)

1	0	0
2	0	0
3	0	0
4	0	1
5	0	0
6	0	0
7	2	2
8	0	2
9	0	0
10	0	0
11	0	2
12	0	0
13	0	0
14	2	0
15	0	0
16	3.5	0
17	0	0
18	0	

$$t = \frac{\bar{X}_r - \bar{X}_u}{\sqrt{\frac{\sum X_r^2 + \sum X_u^2}{n_r + n_u} - \frac{(\sum X_r)^2}{n_r} - \frac{(\sum X_u)^2}{n_u}}}$$

$$t = \frac{.005}{\sqrt{\frac{27.226}{33} (.144)}}$$

$$t = \frac{.016}{\sqrt{\quad}}$$

*For df = 33, p <

$$\begin{aligned} \sum X_r &= 7.5 & \sum X_u &= 7 \\ \bar{X}_r &= .416 & \bar{X}_u &= .411 \\ \text{std.}_r &= 1.003 & \text{std.}_u &= .774 \\ n_r &= 18 & n_u &= 17 \end{aligned}$$

*Significance derived from a non-directional (two-tailed) test.

T-SCORE VALUES

Landscape Factor: COLOR

SCORES

T-SCORE COMPUTATION

Number of Rehabilitat- Undisturbed
Scores(n) ed Land (X_r) Land (X_u)

1	2	1
2	1	1
3	1	1.5
4	1	2
5	1	3.5
6	2	2
7	1.5	1.5
8	1	4
9	2.5	1.5
10	1	4
11	1	2.5
12	1.5	2
13	1	3.5
14	2	3.5
15	1	1.5
16	2	3
17	1	3.5
18	2.5	1

$$t = \frac{\overline{X_r} - \overline{X_u}}{\sqrt{\frac{\sum X_r^2 + \sum X_u^2}{n_r + n_u} - \frac{n_r \cdot n_u}{n_r + n_u - 2}}}$$

$$t = \frac{-0.997}{\sqrt{\frac{23.375}{33} (.144)}}$$

$$t = \frac{-3.510}{\sqrt{\quad}}$$

*For df = 33, $p < .05$

$$\begin{aligned} \sum X_r &= 26 & \sum X_u &= 41.5 \\ \overline{X_r} &= 1.44 & \overline{X_u} &= 2.441 \\ \text{std.}_r &= .565 & \text{std.}_u &= 1.058 \\ n_r &= 18 & n_u &= 17 \end{aligned}$$

*Significance derived from a non-directional (two-tailed) test.

T-SCORE VALUES

Landscape Factor:

Adjacent Scenery

SCORES

T-SCORE COMPUTATION

Number of Scores(n) Rehabilitat- Undisturbed
ed Land (X_R) Land (X_U)

1	1	0
2	0	3
3	1.5	0
4	3	1
5	0	0
6	2	0
7	0	0
8	0	0
9	1	0
10	1	2
11	0	2.5
12	2	0
13	1	3
14	0	2
15	3	3
16	1.5	2
17	3	1.5
18	2	

$$t = \frac{\bar{X}_R - \bar{X}_U}{\sqrt{\frac{\sum X_R^2 + \sum X_U^2}{n_R + n_U} - \frac{n_R \cdot n_U}{n_R + n_U - 2}}}$$

$$t = \frac{.046}{\sqrt{\frac{45.56}{33} (.144)}}$$

$$t = \frac{.116}{.116}$$

*For df = 33, $p < .50$

$$\begin{aligned} \sum X_R &= 22 & \sum X_U &= 20 \\ \bar{X}_R &= 1.222 & \bar{X}_U &= 1.176 \\ \text{std.}_R &= 1.100 & \text{std.}_U &= 1.248 \\ n_R &= 18 & n_U &= 17 \end{aligned}$$

*Significance derived from a non-directional (two-tailed) test.

T-SCORE VALUES

Landscape Factor: Scarcity

SCORES

T-SCORE COMPUTATION

Number of Scores(n) Rehabilitated Land (X_r) Undisturbed Land (X_u)

1	1.5	1
2	1	1
3	1	1
4	0	1.5
5	1	3
6	1	1
7	1	0
8	1	2
9	1.5	2
10	.5	1
11	1	1
12	0	1
13	1	1
14	0	1.5
15	1	1
16	1	1
17	-1.5	1
18	-1.5	1

$$t = \frac{\bar{X}_r - \bar{X}_u}{\sqrt{\frac{\sum X_r^2 + \sum X_u^2}{n_r + n_u} - \frac{n_r \cdot n_u}{n_r + n_u - 2}}}$$

$$t = \frac{-1.43}{\sqrt{\frac{18.124}{33} (.144)}}$$

$$t = \frac{-1.72}{\sqrt{\dots}}$$

*For df = 33, $p < .10$

$$\begin{aligned} \sum X_r &= 14.5 & \sum X_u &= 21 \\ \bar{X}_r &= .805 & \bar{X}_u &= 1.235 \\ \text{std.}_r &= .824 & \text{std.}_u &= .640 \\ n_r &= 18 & n_u &= 17 \end{aligned}$$

*Significance derived from a non-directional (two-tailed) test.

T-SCORE VALUES

Landscape Factor: CULTURAL MODIFICATIONS

	SCORES	
Number of Scores(n)	Rehabilitated Land (X_R)	Undisturbed Land (X_U)

1	1	-2
2	0	-1
3	-.5	-1
4	-1	0
5	0	-1
6	0	0
7	-1	-2
8	-.5	.5
9	0	-2
10	-.5	0
11	-1	0
12	-1	.5
13	0	1
14	2	1
15	0	-1
16	1	0
17	-.5	0
18	-1	1

$$\begin{aligned} \sum X_R &= -3 & \sum X_U &= -7 \\ \bar{X}_R &= -1.66 & \bar{X}_U &= -.411 \\ \text{std. } r &= .822 & \text{std. } u &= .987 \\ n_R &= 18 & n_U &= 17 \end{aligned}$$

T-SCORE COMPUTATION

$$t = \frac{\bar{X}_R - \bar{X}_U}{\sqrt{\frac{\sum X_R^2 + \sum X_U^2}{n_R + n_U} - \frac{n_R \cdot n_U}{n_R + n_U - 2}}}$$

$$t = \frac{.245}{\sqrt{\frac{27.092}{33} (.144)}}$$

$$t = \frac{.303}{\sqrt{\dots}}$$

*For df = 33, $p < .50$

*Significance derived from a non-directional (two-tailed) test.

A VISUAL ASSESSMENT OF REHABILITATED SURFACE
COAL MINES IN THE WESTERN UNITED STATES

by

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B.S. Business Administration,
University of Colorado, 1985

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF LANDSCAPE ARCHITECTURE

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1989

ABSTRACT

Environmental legislation enacted since the mid-1960's reflects growing public interest in the protection of scenic values. Surface coal mining in the western United States is expected to impact millions of acres of public and privately owned land during the next decades. Since the enactment of the Surface Mining Control and Reclamation Act of 1977 over three million acres of mined land have been rehabilitated. Lack of research into the aesthetic quality of rehabilitated landscapes has made it difficult to assess the effect of surface coal mining on visual resources. The purpose of this study is to assess the visual quality of rehabilitated surface coal mines in the western United States. The Bureau of Land Management Visual Resource Management process is adapted to measure the scenic quality of rehabilitated lands. The methodology compares the scenic quality of rehabilitated lands to adjacent undisturbed lands. The results suggest that rehabilitated lands are less scenic and more homogenous than undisturbed lands. Further analysis indicates that these findings are primarily due to differences in topography. Conclusions support: greater consideration of the visual resource; changes in regulatory policy; the application of innovative reclamation technology; and refinement of visual assessment measures.